A Chilton Publication

the Iron Age

THE NATIONAL METALWORKING WEEKLY • OCTOBER 21, 1954

What's new in automation
See page 213

VALLEY MOULD & IRON CORP.

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"...now—I can handle light or heavy loads easier, smoother and with greater accuracy."

It's true . . . any crane operator can do a more efficient job with Whiting's new magnetic Selectodyne hoist control. Having eleven instead of the conventional five speed selection points, Selectodyne permits precision handling of any load . . . light *or* heavy. Selectodyne provides *easier*, *smoother* load handling at speeds that assure the utmost in safe, sure crane control. Simple in design, trouble-free in operation, Selectodyne is another reason why Whiting Engineered Cranes perform better at lower cost!

WHITING CORPORATION
15601 Lathrop Ave., Harvey, Illinois

New Selectodyne Folder

Gives complete information on the advantages of this remarkable new control. Write for your copy today!

WHITING

MANUFACTURERS OF:
CRANES • TRACKMOBILES • TRAMBEAM • HOISTS
•
FOUNDRY, TRANSPORTATION AND CHEMICAL PROCESSING EQUIPMENT

He's Chalking One Up For Quality

One thing is certain in making hot-rolled carbon bars – the better the billet the better the bar. If you supply good, sound, *properly prepared* billets to the bar mills, they will deliver a quality product to the cooling beds.

But there's a lot behind that phrase, "properly prepared." It means that the bloom is *skinned* – hot-scarfed over its entire surface – before being rolled down to a billet. Next, billets that are ticketed for bars beyond ordinary merchant quality get a thorough going-over by an eagle-eyed inspector like the man shown above, at work in our Lackawanna plant.

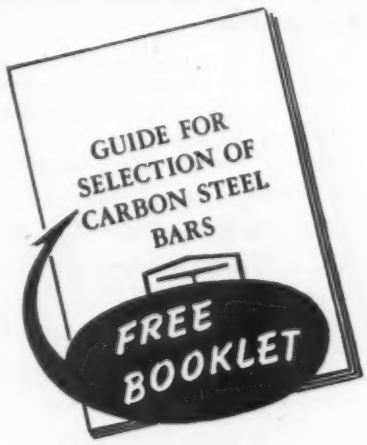
He checks billet ends for signs of "pipe"; thoroughly goes over all other surfaces for defects such as scabs, slivers or seams. When he spots an imperfection, he chalk-marks the area for hand-scarfing by the men shown in the background. After scarfing, the inspector carefully re-checks the billet. When that billet gets his final OK, you can be sure its surface condition is right for rolling in the bar mill.

These inspectors and the scarfers who work with them – as well as the Bethlehem people in the raw-materials stockyards, around the furnaces and in the mills – are good, reliable men. They're proud of the excellent equipment they work with, and they're proud of the top-notch products they make . . . quality products like Bethlehem Hot-Rolled Carbon Steel Bars.

If you're in the market for hot-rolled carbon bars, why not see what Bethlehem has to offer? You'll be well pleased! Just write or call the Bethlehem sales office nearest you.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation



In this booklet you'll find a discussion of some important decisions which the user must make in selecting the right grade and type to fit his needs. Contains 32 pages, including 6 pages of highly useful engineering data sheets. Write for a copy to Publications Dept., Div. I*, Bethlehem Steel Company, Bethlehem, Pa.

BETHLEHEM HOT-ROLLED CARBON BARS

STANDARD SECTIONS • SPECIAL SECTIONS • BAR SIZE SHAPES

BETHLEHEM STEEL

the Iron Age

Vol. 174, No. 17, October 21, 1954

DIGEST OF THE WEEK

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NEWS DEVELOPMENTS

NEED FOR METALLURGISTS GROWS CRITICAL — P. 165
Need for metallurgists is causing real concern in metalworking, metal production. Only about 1500 graduated this year. They were gobbled up—but at least 2000 more could be absorbed. ASM sponsors programs to attract students, bolster training. Newly graduated metallurgists seem interested in an immediate jump to white-coated research positions—not steel industry jobs. Many have false impression of what a metallurgist's task really is.

FORD MOTORS LIKES CLEVELAND AREA — P. 167
Soon to be one of three top employers in Cleveland, Ford Motor's head cites freight advantage, labor supply, steel availability and decentralization as major reasons for huge expansion in this area.

SCRAP TRADE EYES RISING INGOT RATE — P. 168
Steadily climbing steel production is lifting the scrap market with it. Holds promise of strength at least through the rest of the year. Export business—estimated at 1 million tons—started the rise. Higher melting rate means mill stocks won't stretch as far but many idle blast furnaces are acting to prevent any possible scrap price runaway.

INDUSTRY STUDIES ATOMIC ENERGY USAGE — P. 171
Forums discuss problems of adapting nuclear energy to needs of industry. Cost secrecy to foil Reds is a stumbling block to planners. Successful competition of atom fuel with coal in generating electric power is predicted. Radioisotopes in use already.

SPOTLIGHT NEW TITANIUM TECHNIQUES — P. 175
Attendance at first national titanium symposium topped expectations by 50 pct as industry gathered to hear about latest techniques. See promising future in aircraft uses. Extruded shapes, tubes now on market. Report economies in powder parts.

WHAT'S THE OUTLOOK FOR THE ECONOMY — P. 181
Conventional economists have earmarked the next 14 months as a period of stability. But the "maverick" forecasters are counting on a strong uptrend. They believe increased defense spending superimposed on an economy that is already on the upswing will make '55 a very good year.

IN METALWORKING

MARKETS & PRICES

ALLOY STEEL SALES START PERKING UP — P. 172
Alloy steel producers see better times ahead. The 16 month decline has been reversed and the sales trend is pointed up. One large mill notes a 50 pct pickup. Other producers report smaller gains. Automotive orders are the main source of recent strength. Defense orders are expected to help the market in 1955. Some new applications are being cultivated.

STEEL PRODUCT SHIPMENTS SHOW UPTURN — P. 173
Oil country goods, tinplate, galvanized sheet, merchant wire products top '53 in 8-month shipments. And many products that were declining earlier have now turned up again, though some will not reach last year.

ANNIVERSARY IS TIME TO STRUT YOUR STUFF—P. 177
A company birthday is a good time to show customers and the public what your firm can do. Cincinnati Milling Machine Co. has gone all-out to make its 70th birthday a worthwhile celebration.

MARKETS & PRICES

STEEL MARKET REFLECTS GAINS IN DEMAND—P. 317
The steel market is gaining momentum like a single wing attack to the strong side. No matter what buyers thought a few weeks ago, they are now in a mood to place orders. It's more than just the end of an inventory correction cycle plus renewed automotive buying. Extending of delivery dates makes the same inventory look a lot smaller than it used to.

STEEL DELIVERIES BECOME MORE EXTENDED—P. 318
Steel consumers are reversing purchasing policy. Short term ordering is on the way out. Today's orders are being placed a good deal farther ahead.

STRIKES SETTLED, ODM RELEASES COPPER — P. 320
Now that strikes in the copper industry have been settled, the government is releasing 17,500 tons of the metal accumulated under production-boosting contracts. It is not stockpile copper. Another 9000 tons will be withheld from stockpile shipments.

SPECIAL METAL SHOW ISSUE—

WHAT'S NEW IN AUTOMATION

AUTOMATION: CHALLENGE TO ENGINEERS — P. 214
Major advantages of automation include improved product quality, increased production at lower cost, reduced in-process inventories and improved working conditions. Ability to reap these benefits will depend on proper application of automation, sound engineering, efficient tooling and many other factors.

NEW APPROACH TO PARTS DESIGN DEMANDED—P. 218
Visualization of potential gains resulting from automatic processing starts with the product itself. Daring new concepts in loading of parts, scheduling of operations, role of machine tools, and importance of automatic subassembly are involved. This manufacturing revolution offers new opportunities for an imaginative approach to the development of product and processes.

INDUCTION HEATING MEETS BASIC NEEDS — P. 221
Short time cycles, accurate control, and good reproducibility make induction heating well suited to automation. With appropriate handling equipment, many induction heating operations are now fully automatic.

AUTOMATION REACHES MANY FOUNDRIES — P. 224
In a period of keener competition ahead, foundries are faced with the tough problem of how to remain competitive. Automation may be the answer. Most foundries, already using some form of automatic operation, can be easily fully automated.

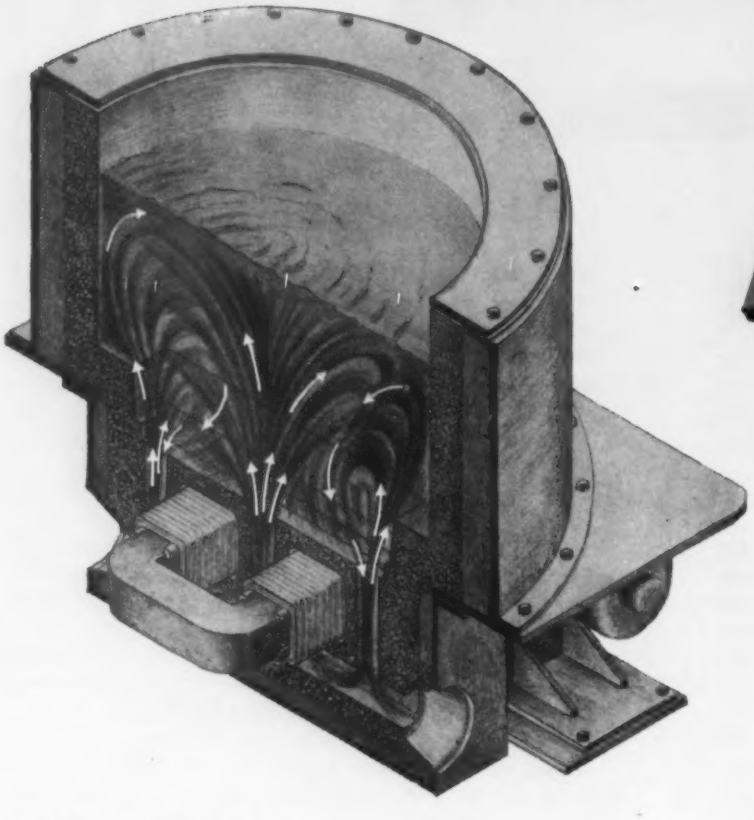
GEAR FINISHING, INSPECTION AUTOMATED — P. 228
Automation in gear production is now in an advanced state of development. Further automation will probably evolve around the adaptation of present standard equipment to automation concepts.

AUTOMATIC EQUIPMENT IMPROVES FORGING—P. 231
New trends in forging have left the village blacksmith far behind. Modern automatic equipment leads the trend in making forgings faster, stronger, more complex, more accurate, and with better finishes.

BUILT-IN GAGING GROWS WITH AUTOMATION—P. 234
Built-in gaging devices are the "traffic cops" of modern, automated machine tools and transfer lines. They warn of approaching out-of-tolerance conditions; reject parts; stop machines and spot errors.

PROGRAM AND LIST OF EXHIBITORS — PP. 238, 274
Technical program for the participating societies gives time, date, place of technical paper presentations. The classified list of exhibitors will aid in show coverage.

The Furnace that Stirs Itself!



ELECTROMAGNETIC PRESSURE CIRCULATES MOLTEN METAL

— In this 60 Cycle —

AJAX TAMA-WYATT *Induction Furnace*

Heat is generated only in the melting channels. Controlled stirring *(neither too much nor too little)* guarantees uniformity of metal temperature and alloy composition and also leads to efficient melting of light scrap. Tiresome puddling is eliminated. The metal is held entirely in an inert refractory lining. The atmosphere is cool and free from contaminating gases.

No Other Method Enables such Completely

CONTROLLED MELTING

Today, AJAX builds a complete line of these time-tested furnaces in standard sizes up to 333 kW for the dependable melting of aluminum, brass, copper and zinc. Units for special applications are carefully engineered to specifications.

TWIN COIL INDUCTORS

Lead Non-Ferrous Melting

The sectional view above shows the twin coil stirring action of the 100 kW Ajax-Tama Wyatt 60 cycle induction furnace. Heat induced in the secondary channels below is conveyed throughout the melt by electromagnetic circulation as shown by the arrows. The 100 kW furnace shown here, which will be on display at the 1954 Metal Show, is one of a family of twin coil furnaces available today for melting rates from 300 to 10,000 lbs per hour.

We cordially invite you to inspect the 100 kW AJAX furnace exhibited at the NATIONAL METAL SHOW, Chicago, Nov. 1-5, 1954, Booth #752.

AJAX TAMA-WYATT

AJAX ENGINEERING CORP., TRENTON 7, N. J.

INDUCTION MELTING FURNACE

AJAX ELECTRO METALLURGICAL CORP., and Associated Companies
AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting

roduction for interchangeability

Here are two Kingsburys, custom-built to serve in widely separated product fields. Each justifies its investment. One drills a small hole and mills a notch in a forged steel connecting rod. The other works on a cast aluminum sole plate for a steam iron: drills 26 holes and spot-faces a boss.

Could this work be done on single-operation machines? "Yes." But could the connecting rods be machined for eight-tenths of a cent each? And the sole plates for one-and-one-fifth cents each?

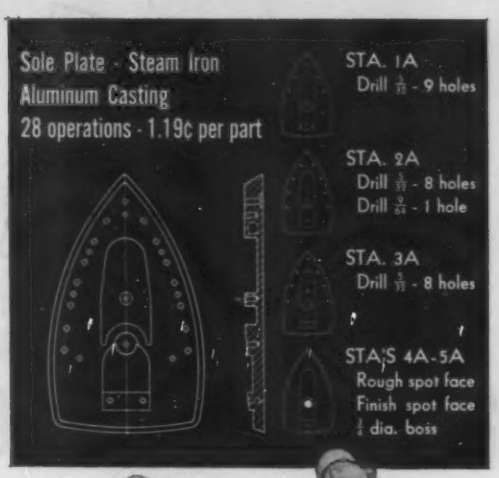
Kingsburys have so many advantages. For example: One work fixture positions the part for each successive operation. Standard units perform the operations within a pre-determined time cycle to obtain the best output with required accuracy. Tolerances are held to specifications. Scrap loss is reduced to a minimum. Floor space is saved. Handling is reduced. One operator loads and unloads the machine. And your parts will be interchangeable, reducing your assembly time.

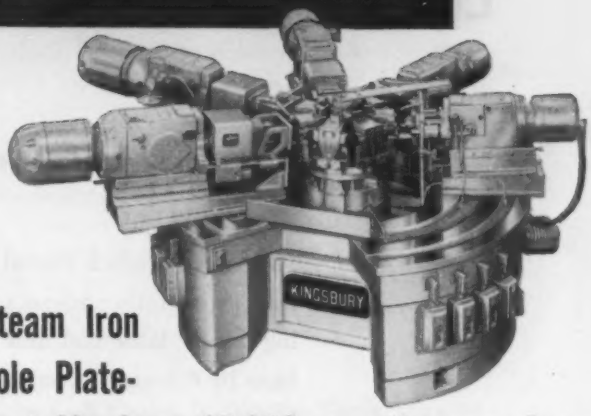
You can drill, spot drill, flat-bottom, ream, burr-ream, counterbore, countersink, mill, end-mill, hollow-mill, tap, thread, face, spot-face, form, recess, saw, trepan . . . all within certain limitations. For instance: Your product must be such that it can be machined within the limits of 5 HP units, and of a size and/or weight that can be handled efficiently by an operator.

We have some interesting bulletins we shall be glad to send you. Perhaps you manufacture a part where a few cents saved would put you in a better profit position and pay for the cost of a Kingsbury. Let's talk it over.

Kingsbury Machine Tool Corp.
107 Laurel Street, Keene, N. H.

KINGSBURY
AUTOMATIC DRILLING AND TAPPING MACHINES
for Low-Cost High Production





Steam Iron Sole Plate- Cast Aluminum 17,920 operations per hour

Here's a case where a Kingsbury really "gangs up" to get the work out! The part is a cast aluminum sole plate for a steam iron; 26 angular holes to be drilled and one boss to be spot-faced.

The machine has an 80-inch base and a 20½-inch diameter index table with 7 fixtures. Five drilling units are mounted on the base. Two of these have 9 spindles each, one has 8 spindles and two have single spindle heads to perform the rough and finish spot-facing operations on one ¾-inch boss. Bushings guide all tools.

The table indexes through five working stations. At Station 6, work is unclamped automatically and removed by the operator. At Station 7, the operator places new work in the fixture, where it is clamped automatically.

perations per hour on two forged steel connecting rods

The problems: to drill a concentric step-down hole thru, at an angle of 30°, in each of two connecting rods; also to mill a notch in each rod for the bearing.

To obtain high production at low cost per part, the machine was designed to handle *two* parts in each work-holding fixture. Six Horizontal (H) Units are mounted radially on an 80-inch base. The 26-inch index table has six of these "twin" work-holding fixtures, automatically clamped and unclamped. The machine indexes through five work stations where eight operations are performed. The longer holes are drilled in two operations to maintain a balanced time cycle at each station. Bushings guide all drills.

Station 1, Unit 1 H has two-spindle head and drills one .129 dia. hole at an angle of 30° in each rod to half the required depth.

Station 2, Unit 2 H with milling unit mills the notch in the *right* hand part.

Station 3, Unit 3 H has two-spindle head and completes the drilling of the .129 hole in each rod.

Station 4, Unit 4 HR is a single spindle unit with sensitive feed; drills .067 hole thru from bottom of .129 hole in *right* hand part. *Unit 4 HL* with milling unit mills the notch in the *left* hand part.

Station 5, Unit 5 H is a duplicate of Unit 4 HR: drills .067 hole thru from bottom of .129 hole in *left* hand part.

Station 6: operator removes the two finished parts and replaces them with two new parts. Parts are unclamped and clamped automatically in the work fixture.

Here's another reason it pays to get a proposal from Fosdick

"Lathe Bed Production Time Slashed 6 hrs."

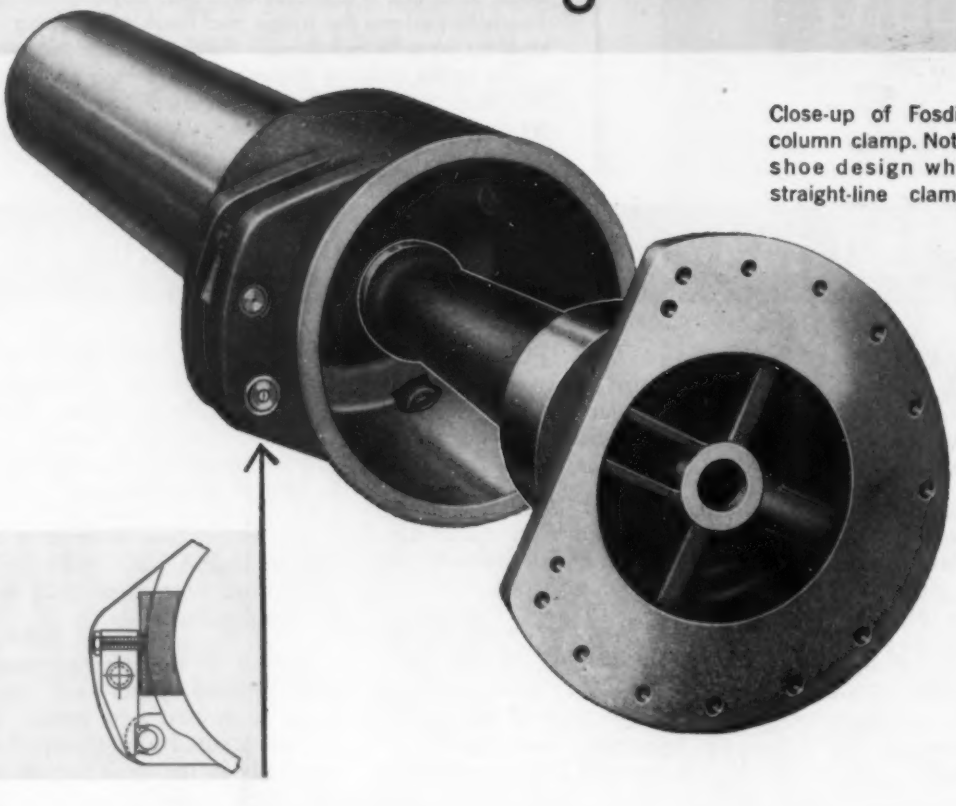
"Since installing our new FOSDICK"...

says Sidney Machine Tool Co.

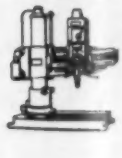
"Our new Fosdick Radial is easy to handle, requires less time for job set-ups. And its operating advantages are numerous. Formerly, we put 28 hrs. into drilling our 28' lathe bed. But with our new Fosdick Radial Drill, we've cut drilling time by 6 hours . . . saved valuable production time! We've found that it pays to get a proposal from Fosdick."

Fosdick Hydraulic Radials are available with 3' to 8' arms, 11" to 19" columns. For full information, ask for Bulletin AT-1.

Fosdick Radials give Faster Drilling...



Close-up of Fosdick hydraulic column clamp. Note the sliding-shoe design which gives it straight-line clamping action.



The Iron Age Newsfront

Stage Set for Automation Spread

Stage is set for a substantial spread of automation beyond the plants of larger companies. To hold or cut back price lines and meet competition, bigger companies are urging parts suppliers to bring operations to peak efficiency. Alternative could be return of many operations to plants of prime producers. Net Result: Many suppliers will put automation ideas to work in their plants.

Wanted: More Uses For Stainless Extrusion

Appli[cation] of extruded stainless shapes to jet engine[s] is increasing. One aircraft engine builder has assigned a full-time engineer to finding ad[ditional] uses for such shapes. Advantages incl[ude] reduced scrap loss, lower tooling costs, flexib[ility], close to finish tolerances.

Powe[r] and Performance Will Exceed

Power and perfo[rmance] in the low priced automotive field for 1[955] will exceed all previous speculation and pre[dictions]. Competition in this segment of the indu[stry] has led to some outstanding engine deve[lopments]. Not all of these will appear with the ne[w] model announcements, but will be brought out later in the model year.

Automation fo[r] the Small Foundry

An automatic foundry syst[em] capable of handling flasks from fill to sha[keout] is now being used successfully. The packa[ge] system, designed for the small foundry, sharp[ly] cuts labor and space requirements. Three [hundred] finished sand molds per hour can be produced, moved through pour stations and sh[akeout].

Rolling Stock G[oal]: Out of Sight

Orders for new freight cars are too scanty to permit car builders to make up, by the end of this year, the 82,000-unit def[iciency] in the current rolling stock goal set b[y] the government. Total backlog of car orders has dropped about 50 pct since Jan. 1, and reduced workloads have resulted in shutdowns of shops.

Less Publicized, But Equally Important

Less publicized than some automotive developments, but equally important, are the improvements in body work that will be found on the new cars. In one company, improvements in jigs and fixtures have cut tolerances to limits unheard of a short time ago.

Effect of Creep In Plastic Tools Studied

Creep properties of plastics, rather than improper cure, are now credited by some tool engineers as a cause of distortion in some plastic tools. One large user has adopted an 8 to 1 (face to depth) rule of thumb in building plastic tools to minimize distortion.

Road Building: Major Market Opening

Suppliers of road-building and bridging equipment have a big stake in the stepped-up program of federal aid to the states for highway construction. Now in the making is a sizable demand for the equipment that will be used in updating the national system of highways and secondary roads.

Cold Cleaner Effective On Steel Parts

Results obtained in cleaning steel parts with a non-solvent type cold cleaner, in a still tank, are said to equal results obtained in mechanical washing. Advantages of the cold cleaner are that it eliminates the need and cost of heating the solution and requires only gentle agitation.

Reinforced Resin Applications Gain

Polyester fiberglass reinforced resins are gaining more applications in the steel industry for pickle tank covers, fume ducts and acid proof piping. Advantages claimed are good chemical and temperature resistance, light weight, strength and ease of fabrication.

NEWSFRONT · NEWSFRONT · NEWSFRONT · NEWSFRONT

Converts from steam engines to diesel ...uses Morse Silent Chain Drives

Case-enclosed Morse Silent Chain Drive

Exclusive Morse Rocker-Joint. The joint action is a rocking action, resulting in less lubrication, and requiring extra-long service life.

The steam drives on four large dock cranes at the Pulpwood dock of Hammermill Paper Company, Erie, Pennsylvania, were converted by Great Lakes Diesel to 70-hp diesel engines with torque converters. They are used to drive 10-ton cranes which unload four-foot and eight-foot logs by chain slings from the lake steamboats.

The diesel drives use Morse Silent Chain, ¾″ pitch x 4″ wide, and include cases for the drives. The motor drive sprocket has 23 teeth, the driven sprocket 149 teeth.

Morse Silent Chain Drives transmit power smoothly and noiselessly, with over 99% efficiency. The service life of the drives is exceptionally long and trouble-free. Smooth, positive action reduces slippage losses on shaft bearings. The exclusive Morse Rocker-Joint construction converts sliding action to rolling motion. Morse Silent Chain Drives are compact, unaffected by atmospheric conditions.

Available in pitches from ⅜″ to 2″, these drives will handle fractional horsepower or hu[illegible]power in a single drive.

For more detailed information on [illegible]sion-built Morse Silent Chain Drives can help you t[illegible]our applications, contact your local Morse distribu[illegible]tor. Or, write:

MORSE CHAIN COMPA[illegible]ANY
7601 CENTRAL AVENU[illegible]E
DETROIT 10, MICHIG[illegible]AN

MORSE
POWER TRA[illegible]CHANICAL [illegible]NSMISSION PRODUCTS

BW

FOR 24 REASONS, MASTERS OF MECHANICAL POWER TRA[illegible]SMISSION SINCE 1893

1 STANDARD ROLLER CHAINS	2 HIGH-ENDURANCE ROLLER CHAINS	3 SPRING-LOCK ROLLER CHAINS	4 ROLLER CHAIN SPROCKETS	5 TAPER-LOCK SPROCKETS	6 DOUBLE-PITCH ROLLER CHAIN DRIVES	7 CABLE CHAINS	8 ATTACHMENT CHAINS	9 SILENT CHAINS	10 SILENT CHAIN SPROCKETS	11 HY-VO DRIVES	12 AUTOMOTIVE TIMING CHAIN DRIVES
13 FLEXIBLE ROLLER CHAIN COUPLINGS	14 FLEXIGLE SILENT CHAIN COUPLINGS	15 MORFLEX COUPLINGS	16 MORFLEX RADIAL COUPLINGS	17 MORFLEX & RADIAL DRIVESHAFTS	18 MARINE COUPLINGS	19 OVERRUNNING CLUTCHES	20 OVER-CENTER CLUTCHES	21 FULLMO[illegible] CLUTCHES	22 TORQUE LIMITERS	23 CENTRIFUGAL CLUTCHES	24 VARIABLE SPEED CONTROLS

METALLURGISTS: Need Is Critical

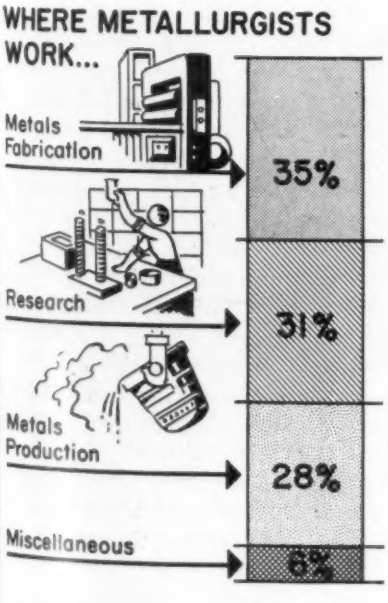
Industry, government, research grab 1954's 1500 metallurgy grads . . . Need 2000 more . . . American Society for Metals sponsors programs to interest students, bolster training—*By T. M. Rohan*

♦ THE NEED for metallurgists is causing genuine concern in many fields of metalworking and metals production. Preliminary surveys last week indicated that only about 1500 metallurgists graduated this year. At least 2000 additional could have been absorbed by industry, government and private research if available.

The American Society for Metals in Cleveland, foremost U. S. group pushing metallurgy education, last week indicated there will be only about 800 graduates next year while demand for them will be even greater, principally in the metalworking field.

Vie For Grads

So much technical development today is tied in with availability of high-resistant alloys for civilian and defense work, shortage of metallurgists is rapidly becoming critical. (THE IRON AGE, June 10, 1954, p. 76.)



The few graduates available find metalworking firms eager for their services. A recent bulletin by the Bureau of Labor Statistics indicates that graduate metallurgists are getting a higher starting salary than any other segment of engineering —averaging $380 per month—well ahead of more popular chemical and electrical school grads.

And the shortage is getting worse at a time when emphasis on metals is increasing due to research on high - temperature and high - pressure requirements.

Offer Top Salaries

One of the most pressing needs is for metals technicians for industry who could free metallurgists from constant detail work. ASM is currently working with state boards of education to get these courses started in vocational schools.

To the average high school graduate, metallurgy appears dull, as evidenced by the minor percentage of college registrants indicating they intend to pursue it.

But rewards are considerably higher than most suspect. The top salary a metallurgical engineer admitted to this year in an ASM survey was $48,000. But ASM believes the highest actual salary in the field of 6500 companies covered is probably double that.

Train Metal Technicians

About 80 pct of all active metallurgists are in metal fabrication and manufacturing where the need tops all other fields.

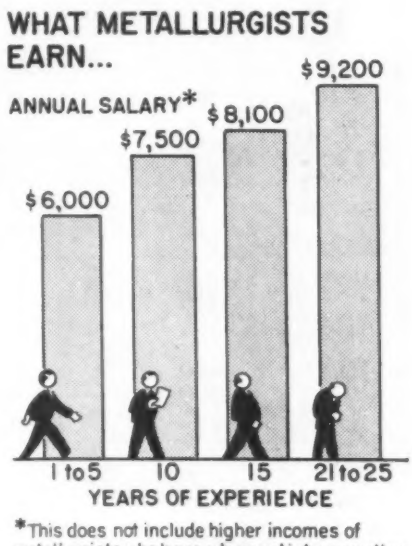
B. A. Buescher, manager of technical placement for Thompson Products Co. of Cleveland, major auto and aircraft parts manufacturer, told THE IRON AGE last week that firms such as his find it more expedient now to train present employes interested in this field to do only one or two jobs, freeing the metallurgists for supervisory work.

Trainees end up as specialists and pressure of current work keeps them bracketed with little opportunity to become all around metallurgical experts. Currently Thompson has 115 metallurgists — could absorb 15 more today.

Mr. Buescher, who annually visits colleges and universities to recruit new engineers, said only 3.8 pct of all college students are now engaged in metallurgy, and of these 70 pct are subject to military service. With the great number of firms competing for their services, graduates become choosy and pickings are rather lean, for most companies.

Get False Impression

Steel companies complain that graduating metallurgists don't want to get their hands dirty in a steel



*This does not include higher incomes of metallurgists who have advanced into executive positions in management.

mill. One industry leader last week told THE IRON AGE that steel companies, being a logical mecca for metallurgists, don't have too much trouble locating the highly trained men they need.

But, he said, the vast majority of recent grads are interested in an immediate jump into original research, complete with white coat, clean office, tile-lined laboratories and "metallography specialist" stature. He indicated that present emphasis on importance of research technology in technical magazines, helps advance a false concept of what the work of a metallurgist involves.

Sponsor Fellowships

The bulk of metallurgists today is absorbed into smaller metalworking companies of 100 to 300 employes. Major increases in quality control, heat-treating and testing offer the most fertile markets. Thus they become principally trouble shooters and only 20 pct of all metallurgists at the most get into fields of metals production and original research.

ASM is digging deep into the ranks of high school and technical schools in an effort to broaden the base of talent eventually available for government and private industry.

Newest advancement by ASM is a fellowship program started this year. Engineering school deans are requested to nominate one of their graduates who has had at least one year's experience in industry or research who will return to college for an advanced degree. The nominees, most of whom can obtain a 1-year leave of absence from their employers are awarded $2400 if single or $3000 if married, plus $1200 tuition and fees for the year. Many employers also continue paying salaries.

Back Summer Courses

ASM is also sponsoring 2-week summer courses in metals at technical schools and leading universities. Institutions participating in this summer program via state boards of education include: University of Pennsylvania, Oswego (N.Y.) State Teachers College, Hartford Scientific School, Wayne University, University of Illinois and University of California. Next year it is expected that Ohio State and the University of Indiana will be added.

Teachers are hired from industry, conduct classes which average about 24 students each.

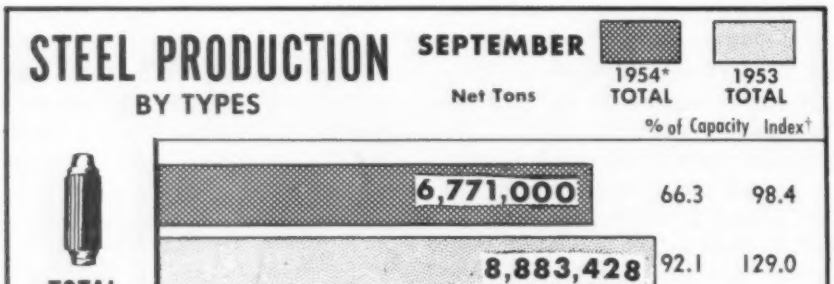
At the grade and high school level, 487 awards totalling $11,000 have been made in the last four years to high school and junior high pupils for papers written on any branch of science. Over 9000 entries were received last year and awards have increased 100 pct since the start of the program. College scholarships awarded last year totalled $19,600. Individual awards of $400 each went to 49 students in 50 U. S. schools currently conducting degree courses in metallurgy. Money is sent to the school which presents it to a student of its selection. Awards are based on outstanding accomplishments, and financial need. Sophomores are particularly recommended for the award, but men from other classes may receive it at discretion of the faculty.

Furnish Visiting Lecturers

For the last three years ASM has sponsored a visiting lectureship to universities with established metallurgy courses. The school suggests a lecturer and title for a 2-3 day seminar and contributes $25. The ASM furnishes the lecturer, usually a leader in metalworking and pays his expenses plus $100 per day which in some cases is declined. Ten lectures will be conducted in the current scholastic year at Johns Hopkins, Purdue, Missouri School of Mines, Rensselaer Polytech, University of Wisconsin and Illinois Institute of Technology.

Encourage Young Teachers

Younger university teachers are also given awards to encourage additional work in metallurgy. In the past three years nine awards of $2000 each have been made to teachers under 41 years of age for outstanding teaching performance. Recipients are recommended by local ASM chapters, universities or any technical society. The age stipulation is intended so that awards do not automatically go to older department heads. Recipients this year were Joseph F. Lipsch, Professor of Metallurgy, Lehigh University, Maurice Sinnott, Associate Professor, University of Michigan, and E. Eugene Stansbury, Professor of Metallurgy, University of Tennessee.



†Index of production based on average production of the three years 1947-1948-1949.

AUTOS: Ford Likes Cleveland Area

Ford Motor Co. will be among top three employers in Cleveland when new expansion is over . . . Henry Ford II cites freight advantages, labor supply, steel availability, decentralization for area preference.

♦ CLEVELAND'S boast of "the best location in the nation" is entirely appropriate as far as the Ford Motor Co. at least is concerned.

Last week Henry Ford II and 11 company officials and directors visited the Cleveland operations which have catapulted the firm from a relatively small operation there to a top employer in the area with four new plants since 1950. Employment is now 8500 and will total over 15,000 on completion with annual payroll of $70 million.

Cleveland's major advantages for his firm, Mr. Ford said, stem from freight advantages, labor supply, proximity to good steel sources and in a backhand way, avoiding too much concentration in the Detroit area where too large a bulk of employment and economy rests on one employer. Mr. Ford added Detroit labor unions have accused the firm of "pulling out" but they are now pretty well satisfied.

Need More Engineers

He added the Cleveland expansion is not a shift in operations from Detroit but a supplementing of the huge expansion already undertaken there. One interesting facet not touched on by Mr. Ford but shared by industry observers is that if continued high sales do not materialize for the company and cutbacks are in order, the newer, higher efficiency Cleveland operations might be kept at capacity and Detroit operations cut back rather than both being slowed down.

Employment in automated plants will probably not vary much from conventional ones. While less production people are used, many more engineers are needed to plan and keep things moving and maintenance is appreciably increased.

Although Ford operations in Cleveland date from a Model T assembly plant, the firm announced in January, 1950, that Cleveland had been selected for a major role in the company's $1.6 billion expansion. On completion Ford will be neck and neck with Thompson Products as second largest local employer. General Motors is first with 20,700 of which 13,500 are in automotive production work for Chevrolet and Fisher Body. Thompson has 15,000 in the greater Cleveland area and Ford will approximate this.

Expand Foundry

Ford's first major move was a new automated engine plant which started production in 1951 and is being followed by another 562,000 sq ft unit due to start in 1955 on V-8 auto and truck engines. The 1951 plant currently turns out all Ford 6 cylinder engines as well as Mercury engines.

An ultra modern new foundry started production in 1952 furnishing blocks for the engine plant. This is currently undergoing expansion. Almost all pig will come from American Steel and Wire's big new $10 million merchant iron furnace.

The fourth major step is an ultra-modern, 1.2 million sq ft stamping plant in suburban Walton Hills expected to start late this year with full production in early 1955. Originally scheduled for 16 lines it has already been enlarged to 22 with employment of 3000. Its capacity will be added to the Dearborn and Buffalo plants, both of which are being expanded.

Need Assembly Plant

In addition Ford has a major sales office and parts depot in Cleveland stocking 12,000 items and handling 150,000 lb daily.

In his visit last week Mr. Ford said that the present expansion is the last contemplated for a while "although as we progress, we always keep spending money." He added the only thing necessary to complete the picture in Cleveland would be an assembly plant but that isn't part of the company's plans right now.

Henry Ford II

". . . As we progress we keep spending money . . ."

Blame Score on Ore

A stockpile of iron ore has sunk nearly forty feet into a swampy area and raised the northern end of the municipal golf course in Virginia, Minn., nearly six feet.

Stockpile, owned by the M. A. Hanna Co., has lain on the swampy area for years.

City officials are seeking an injunction to prevent the company from increasing the stockpile, fearful the land under nearby homes might be affected.

SCRAP: Steel Gains Spurring Demand

Already bolstered by export business, scrap trade warms up as steel output increases . . . See further price rises with higher ingot rate . . . Idle blast furnaces act as damper—*Staff Report*

◆ ALL EYES in the scrap trade are firmly fixed on the steel industry's rising ingot production rate. It holds the promise of a strong scrap market at least through the rest of the year.

Earlier this year the scrap trade was flat on its back—most, if not all, were down and many went out. Prices and tonnage dwindled as the steel ingot rate declined. And with each cut in the melting rate, scrap stocks held by mills stretched farther and farther.

Then, in recent months, export business injected new life into scrap. Prices at seaport cities began to rise—and dragged up some inland prices, too. Predictions were freely made that when the mills wanted scrap they'd have to pay higher prices. Now the mills are buying more heavily and the predictions are proving correct.

Market Turns Up

Sources in the trade estimate that approximately 1 million tons have been sold for export. This compares with an estimated domestic consumption of about 25 million tons for this year.

A few months ago most mills just weren't interested in buying more than token tonnages of scrap. Their own production hit its low, excepting Fourth of July cuts, in mid-August. Steel production then was 62 pct of rated capacity.

Selling steel was a tough job. Consumers were not using as much as previously—and they were still trying to cut inventories to the bone. Then, in September, steel sales began to perk up. New buying by the automotive industry came in October. The quickened tempo led rapidly to higher ingot rates and heavier use of scrap.

Blast Furnace Damper

Heavier use, of course, meant that mill stocks wouldn't stretch as far and this meant a sort of double acceleration of buying—more to melt and more to maintain ample stocks. With the ingot rate now just approaching 75 pct it's no great boom—but the rate is still trending higher.

Don't look for a runaway in the scrap market, though. THE IRON AGE Scrap Steel Composite Price has risen from $26.58 in mid-July to $33.00 this week, but there's still plenty of unused blast furnace capacity to act as a damper.

Philadelphia Feels Export

When scrap is cheap the steel industry prefers to use it instead of pig iron or hot metal. But if scrap prices get too high the mills will quickly switch melt ratios more heavily toward the pig. Remember, while foundry business is improving somewhat, no founders are beating on steel sales office doors for pig iron. There would be some compensation in increased use of blast furnace scrap.

Actually, full effects have not yet been felt and they are mixed. In the Philadelphia district, for instance, export business has been a major factor as in other ports. And most local mills have recently stepped up their scrap purchases. But the ingot rate in this district is lower than the national average by some 10 points and rates of some mills are lagging that.

Stocks Are Heavy

One of the larger steel producers in the area says it won't be in the scrap market at all this year. Reason here is that stocks are very heavy.

A freight rate balance has been struck with scrap originating within 30 miles of the port going for export and more distant material going to the mills. Arriving at this balance did result in higher prices from local consumers and trade sources predict that if the ingot rate climbs further, it will mean still higher prices.

With some Philadelphia dealers reporting that 90 pct of their busi-

Predicts Scrap Boost

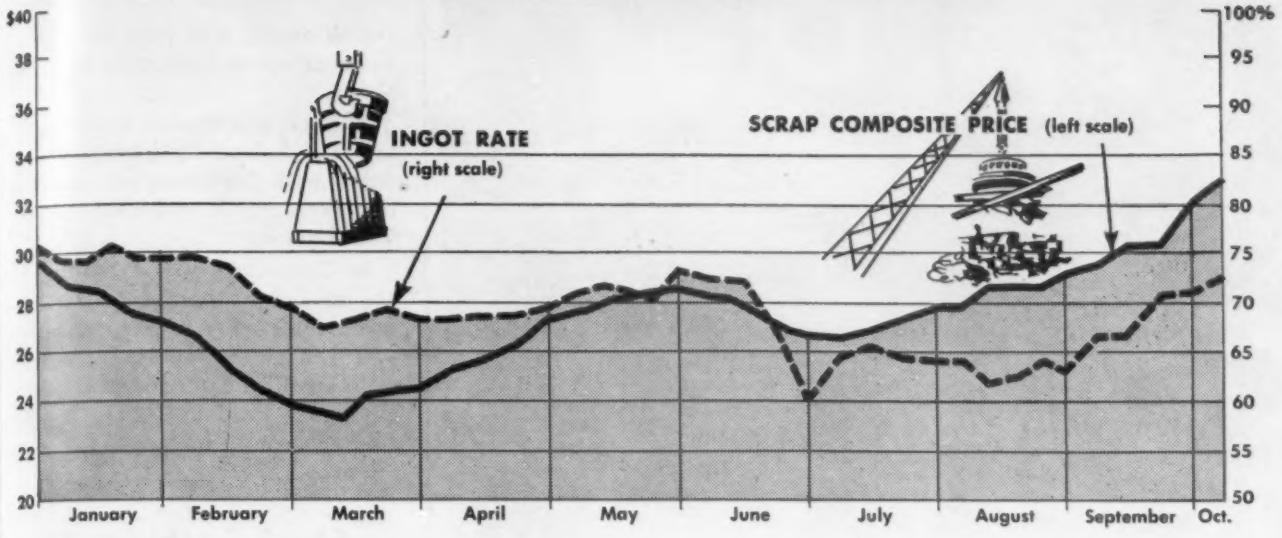
Rearmament of Germany recently approved will shoot U. S. steel production up another 10 to 15 points and boost scrap prices to $42 per ton according to one economist.

Addressing a joint meeting of Cleveland and Akron chapters of the American Marketing Assn. last week, Eliot Janeway, mobilization official and economist, said the rearmament will resolve the tug of war between U. S. buyers and sellers in a decisive victory for sellers. Principal incentive for the increase in operating rate will be a "realization of the severity of the scrap squeeze" which will up the price.

Mr. Janeway also predicted 1955 would bring a buying stampede in the U. S. as German rearmament brings back shortages and clears the way for a big new American defense program to supplement it.

An IRON AGE check of experts in industry shows that many of them believe Mr. Janeway's estimates of the impact of German rearmament are too high. However there is general agreement with his overall analysis of the impact of international events on the domestic economy.

Trend in Steel Rate, Scrap Prices—1954



ness is export, they say that it would take a 20 point rise in the local ingot rate to absorb surplus if the exporting were to stop.

Pittsburgh Comes to Life

In Pittsburgh, traditionally a scrap-minus area, consumers were getting by at reasonably low prices because the major consumer was living primarily from inventory. For months there was little or no activity.

Recent heavier buying, however, has boosted prices and made the market more sensitive. If another large consumer should be forced to buy in the near future it would add fuel to the fire. Increasing ingot rate has also strengthened the turnings market as mills require more hot metal and try to minimize higher prices in openhearth grades.

Detroit Sets Own Pace

At the opposite end of the scale is Detroit, usually a scrap surplus area. Significant factor there is that current prices have been determined by local consumers rather than out-of-district mills as has been the historical precedent.

Aside from a local ingot rate in the 90's, this is largely due to two factors: (1) Current low auto production rate that has resulted in low generation of industrial scrap. (2) Decentralization of auto production, particularly engine and stamping plants, resulting in a large production of automotive scrap close to steelmaking centers.

Therefore, Detroit mills are paying comparatively good prices to keep scrap at home. Formerly, the difference between a Pittsburgh delivered price and a Detroit brokers' buying price was roughly equal to the freight rate. It has been less than that recently.

This fact, more than any real weakness in the market, appeared to be responsible for last week's drop in Detroit prices. Feeling was that prices had moved up far too fast, then dropped back to the realistic market level.

Chicago Stays Strong

Similarly, there's no oversupply of scrap in the Chicago district. Broker buying has been strong, and with a continuing gain in railroad grades, there's every reason to believe the market is in for another hike or at very least will hold at present levels.

A recent purchase confirmed price levels at $34 for No. 1 heavy melting. On the other hand, broker buying prices were advancing following the mill purchases which had served to peg earlier advances.

Scrap supplies are low, there is every indication that the operating rate will continue to advance—and at least locally, there have been several strong advances in mill operations that are serving to encourage the basic market strength.

Another factor is the strength of railroad grades. Rerolling, 2-ft crops and random length rails have been in dwindling supply since the railroad buying cutback last March. Though some sales have been made at $53 in the past 2 weeks, broker buying at $55 and $57 has also been reported.

Turnings have proven another sleeper. Going begging only 2 months ago, with mills able to fill entire orders with industrial quality material, recent orders have been difficult to fill. Supply has proven much lower than was expected, and rapid advances in prices in the past 3 weeks have made this another risk when sold on a large order basis.

Cleveland Holds

Opinion in Cleveland is that the market has about hit its peak, at least for the present. Scrap traders believe a boost in the ingot rate will mean higher prices but mill buyers say prices are at the top unless the rate goes to unexpectedly high levels.

A large amount of idle blast furnace capacity acts as a buffer. If mills could buy enough scrap at $35 they'd leave the stacks idle. But they can't get that much scrap now.

Generation of scrap by automotive manufacturers has fallen way off, leaving supplies low. Two biggest Cleveland producers of auto supplies were generating 11,000 tons of No. 1 grades monthly last year. Last month, however, sale

for shipment was only 6000 tons. Railroad scrap generation has also ebbed.

Youngstown market is currently about $1 behind the normal differential with Cleveland but continuing pressure is expected to lift prices shortly.

In Cincinnati, where demand is not as hot as in northern Ohio, scrap dealers are barging material out. The move is designed to cut local supplies and nudge mills into buying to keep the scrap in the area. But mill buyers won't pay the price.

Start Carbides Firm

PRESIDENT L. Gerald Firth, left, and vice-president W. J. Loach head Firth-Loach Metals, Inc.

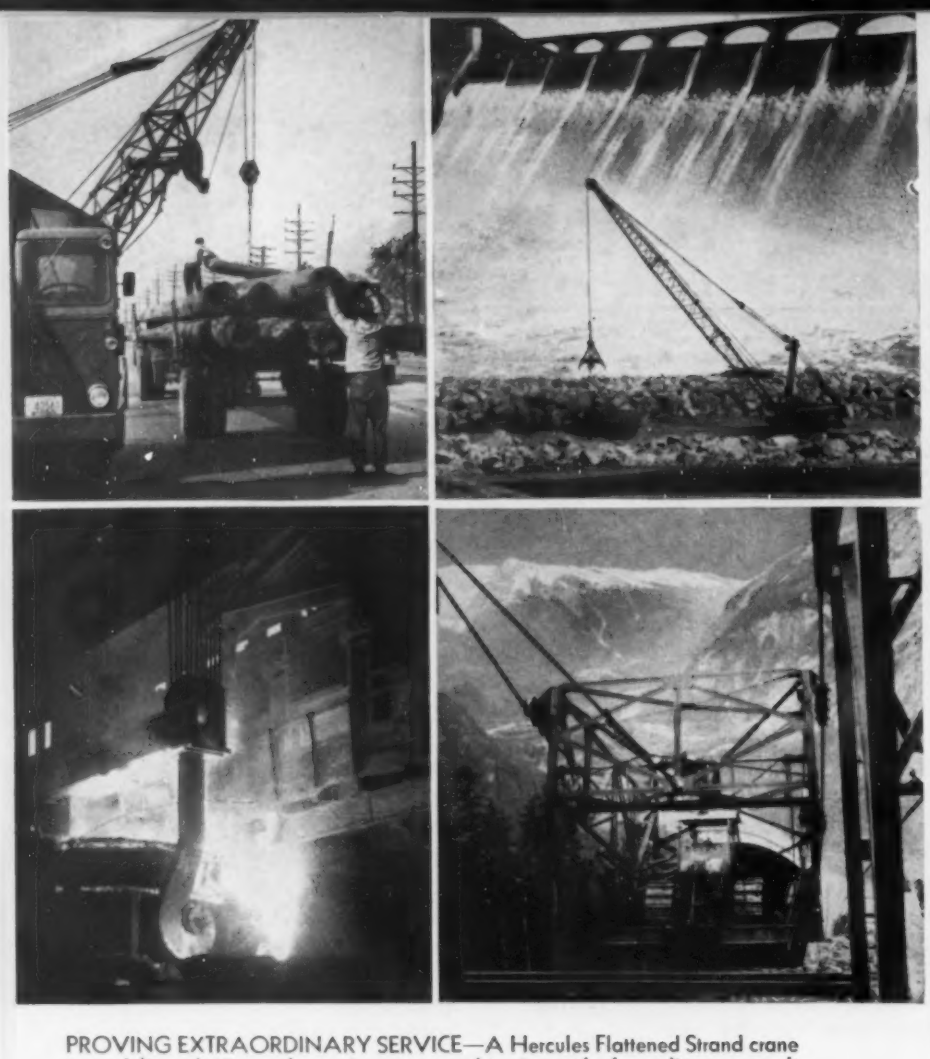
A new company in the carbides field is Firth-Loach Metals, Inc., which began production recently at a newly-equipped plant at McKeesport, Pa.

The company is headed by L. Gerald Firth, former head of Firth Sterling, Inc. William J. Loach is vice-president and general manager.

Firth, a pioneer in the carbides field, emphasized his company will limit its activities to producing basic carbides, that it will leave carbide fabrication to the tool and die industry.

At the outset, Firth-Loach capacity will be approximately 500 lb of hot-pressed and 3000 lb of cold-pressed carbide metals per month. But enough plant space is available to permit expansion to 1000 lb of hot-pressed and 7000 lb of cold-pressed carbide metals monthly.

Key personnel of the company have amassed a total of 196 years' experience in carbide manufacture.



PROVING EXTRAORDINARY SERVICE—A Hercules Flattened Strand crane rope delivered 18 months service, compared to 6 months for ordinary rope. It performed equally well as a clamshell bucket rope. On a hot ladle crane it outlasted round strand rope by 4 to 1. It was chosen for its super strength to haul the car on the continent's largest cableway at Kitimat.

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Flattened Strand Round Strand

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ATOMIC ENERGY: Chart Future Uses

Industry forums discuss problems of adapting nuclear energy to civilian needs . . . Uranium cost secrecy is a stumbling block . . . Predict competition with coal in electric plants—*By R. L. Hatschek.*

♦ ATOMIC INDUSTRY is sure that it's going somewhere—but it isn't sure at this point just what the destination is. The Atomic Energy Act of 1954 is widely hailed as a great advance but Atomic Energy Commission's interpretation, still lacking, is vitally needed before private industry can move realistically ahead.

Members of the newborn already mushrooming industry have gathered twice in the past month in New York. First was the meeting Sept. 27 and 28 of the Atomic Industrial Forum, Inc., which dealt specifically with the new law and its meaning to industry. Second was the Third Annual Conference on Atomic Energy in Industry held Oct. 13 to 15 by the National Industrial Conference Board. This meeting was broader, covering many aspects besides the new law.

Competes With Coal

One phase of the nuclear industry, power, is sure to come into being soon and it's generally agreed that atomic-generated electricity will be commercially competitive with coal in the not-too-distant future. But just when that will be, even aside from technological problems, cannot be determined because even the price of natural uranium is a classified secret. Nor has the government yet established any price for byproduct plutonium.

This does not result from any overuse of the "Secret" stamp. The uranium price, if known by the Reds, would easily enable them to figure too much about our progress and efficiency.

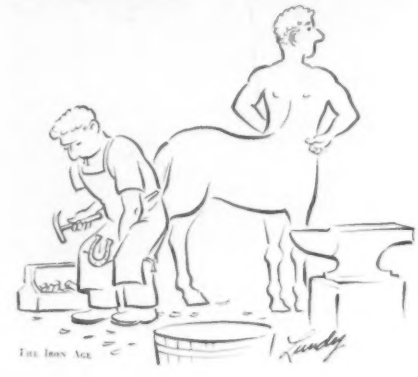
Lack of experience in operating or even building a power plant injects other unknown cost factors. Nevertheless, many estimates have been made. Most of these, probably somewhat conservative, say that nuclear-fueled generating stations should be competitive with coal-fired plants in 10 to 15 years in areas where coal costs $6 to $7 a ton.

One question frequently asked is, "What's the outlook for continued supplies of raw material? Does it justify predictions of huge growth?" Answer is definitely optimistic—though no specific figures can be divulged for security reasons. Domestic sources are estimated to be plentiful for establishment of a nuclear power industry—if there is no major shooting war during the period of buildup.

Need Fuel Backlog

Since reactors must contain a lot more fuel than they actually burn, replacement of spent uranium will be much lower after the power plant is started up. This is estimated at about 2 pct—50 tons annually—per 1 million kw. And if a shortage threatened, breeder reactors can produce more fuel than they burn.

What this means to the large majority of the metalworking industry not interested in power generation or even purchase of nuclear power, is that a huge new market has been opened and that its future is even bigger. But the metalworking industry still wants to know what kind of market it can count on.



Answer to this was outlined at the NICB meeting by Frederick H. Warren of General Dynamics Corp. Under general considerations, he pointed out that (1) About 40 pct of power plant investment is little changed by conversion from fossil fuels to nuclear energy. (2) Fuel core is the one unique element. And (3) all other equipment is converted from standard designs.

Reasons why conversion is needed are (1) possible effects of radiation, temperature and pressure on soundness of present-day turbines, steam lines, condensers, etc., (2) radiation hazard in the event of failure or leakage, and (3) need for optimum nuclear properties.

Use Special Metals

To meet these demands of the budding atomic industry, special metals are needed. Suppliers will be working heavily in metals like columbium-stabilized 347 stainless, extra-low-carbon 304 stainless, zirconium and titanium. Atomic energy projects already use far larger proportions of the first three than any other industry.

Exceptional testing procedures will be required to assure soundness of equipment.

Industrial Usage Booms

Equipment manufacturers will have to engineer practical shop items from theoretical requirements. And the supplier's engineers may well be called upon to do original design work in development, test and practical fabrication.

But atomic energy provides metalworking with more than a new market—it provides new tools and techniques for both old and new jobs. Industrial use of byproduct radioisotopes is surging ahead far more rapidly than atomic power.

MARKETING

STEEL: Alloy Sales Perking Up

Tide has turned in alloy steel business . . . Trend of 16 months reversed . . . Large mill notes 50 pct pickup in orders over past 2 months, other producers register smaller gains—By J. B. Delaney.

◆ ALLOY STEEL producers see better times ahead. The decline that began 16 months ago apparently has shaken itself out.

A large alloy mill notes a 50 pct pickup in order volume over the last 2 months. Other producers, while not so fortunate, agree that orders generally are up.

Significantly, consumers are beginning to order farther ahead. Business for November-December delivery already is on the books. Several months ago, alloy users were placing the bulk of their orders for delivery within 30 days.

Automotive business accounts for most of the pickup. But other users are beginning to get on the bandwagon.

Expect Arms Boost

Also brightening the alloy picture are anticipated increases in defense buying. Many defense products are very heavy users of alloy steel, and any increase in defense spending is bound to be quickly felt by alloy producers.

German rearmament is expected to exert a strong influence on the domestic alloy steel market due to rigid restrictions as to what German industry will be permitted to produce. Feeling is that much of the heavy equipment will have to be produced in this country.

For the alloy mills, it's about time the market improved. Alloy ingot production in first 8 months of this year was off more than 42 pct from the same period of 1953. And that's only part of the story: in order to compete on a delivery basis in a buyers' market, producers were forced to lay up heavy inventories of semi-finished material. This stimulated production but shipments lagged.

Even with the current improvement and prospects for a fair fourth quarter this will be a relatively slow year for the alloy producers.

Ingot production in first eight months of 1954 was just under 3 million tons. Last year the mills produced 5.2 million tons in the same period.

As with other steel products, alloy inventories were a major factor in the decline. But producers believe this is no longer a problem. They feel that inventory reduction has at least slowed down to a walk, if it has not been halted completely.

And their experience has been that inventories are never static; they either move up or down. If this holds true, consumers will begin increasing their stocks. It would not take much of an increase, percentagewise, to spiral production to a respectable level.

Alloy forgings continue slow. Indications are that consumer inventories are still sizable.

SEEMS like yesterday. Oct. 29 will mark the 25th anniversary of the Wall St. stock market crash.

Alloy Ingot Output

1953 net tons		1954 net tons	
Jan.	691,932	Jan.	399,360
Feb.	615,837	Feb.	376,157
Mar.	708,285	Mar.	393,850
Apr.	661,214	Apr.	379,720
May	701,807	May	393,183
June	632,032	June	356,004
July	616,143	July	334,752
Aug.	590,019	Aug.	366,228
Sept.	498,738		
Oct.	405,249		
Nov.	366,299		
Dec.	364,518		

In the automotive field, producers are concerned over the inroads of hardened carbon bars in some applications. Chief reason for this is the differential between the price of alloy and carbon—enough of a differential to warrant installation of hardening equipment by auto producers.

To offset losses of this type alloy producers are preparing to enter fields that up to now have been largely dominated by carbon steel. A step in this direction was taken recently by U. S. Steel Corp. with its T-1 alloy for pressure vessel applications. This may take years to develop fully but every pound sold will be at the expense of carbon steel.

Watch Structurals

The alloy mills also have their eyes on other structural applications. Bridges, for example. They argue that the greater strength of alloy will permit use of lighter sections, which would reduce overall weight and effect savings in tonnage requirements and foundations. These same arguments apply to pressure vessels.

Studies are now being made on the use of alloy in construction of super TV towers needed to cover "dead" reception areas.

STEEL: Shipments Show Mixed Trends

Oil country goods, tinplate, galvanized sheet, merchant wire products top '53 in 8-month shipments . . . Many which eased off, turned up again . . . Rails plummet . . . Strip feels inroads from sheet slitters—By K. W. Bennett.

"I'VE 10 ECONOMISTS telling me where I'm going, and 20 business barometers are being pointed out to me every week to show me the same thing. What I want to know now is, where have I been?"

The speaker was a steel salesman. If business is bad, how bad is it? With an operating rate that dipped from a monthly average of 76.5 pct of capacity in January to an August low of 63.5, some alarmed observers reported steel production in very deep water; older hands were carefully pointing out that the operating rate was based on new capacity figures that represented a production increase of 6.5 million tons over 1953 capacity, and that in September the average went to 66.3 and to 71.7 in the first 2 weeks of October.

One guidepost was performance last year. Starting slowly, first half 1953 developed into a boom year, with sheet, plate, and structural carryovers into early 1954 despite a poor general business level in second half 1953.

Better Than '53

On the basis of tons shipped, tinplate, galvanized sheet, oil country goods, and merchant wire products through the first 8 months of 1954 enjoyed more boom in 1954 than in 1953. Galvanized sheet, for instance, began January at 84 pct of January 1953 sales. By April more galvanized was being shipped than in April of last year, and this item has advanced steadily in tons shipped through August (110.6 pct), last month for which shipment figures are available. Current bookings are solid for the remainder of the year.

Electrolytic tinplate was a skyrocket. Beginning at 101.9 pct of January 1953 sales in January this year, the grade rose to an astronomical 160.3 pct of last year's sales in June (spurred by steel wage negotiations), fell to 53.6 pct in July and by August had bounced back up to 83.7 pct, and is currently strong.

Oil country goods were traveling under a considerable cloud in June of this year, with rumors that drillings would fall off sharply in July. The grade was selling 131.8 pct of January 1953 tonnage in January of this year, hasn't fallen below 120 pct of last year's sales in any month in 1954, and by August was back up to 130.9 pct of sales in the same month a year ago. Last week, a few mills were again extending delivery dates.

Heavy Tonnage Items

In sheets, cold-rolled and hot-rolled are moving up, with cold-rolled leading by a considerable margin. Scattered reports suggest that strip is again moving up, though at a somewhat slower pace. Cold-rolled sheet began at 105 pct of January 1953 shipments in January this year, by July had declined to 65.8, in August was moving upward again. Hot-rolled sheet hit its high in June, has declined since, but is beginning now to follow the cold-rolled sheet movement that began in August.

The heavy tonnage items in total steel sales are cold-rolled sheet, hot-rolled sheet, hot-rolled bar, heavy structural, plate, and total wire and wire products. Of these, cold-rolled sheet and wire are moving up sharply. Hot-rolled bar and hot-rolled sheet are registering gains. Hot-rolled and cold-rolled strip are beginning to register gains, despite inroads by sheet slitters among customers who want narrow width but don't require strip quality.

High or low, 1954 depended pretty much on the individual product line. And nearly all of them are now beginning to register some sort of improvement.

Steel Shipments Compared

Electrolytic Tinplate

Thousands N. T.

	1953	1954	pct. 54 of 53
January	311	317	101.9
February	267	297	111.2
March	318	354	111.3
April	319	340	106.5
May	336	461	137.2
June	313	502	160.3
July	302	162	53.6
August	271	227	83.7

Galv. sheet

Thousands N. T.

	1953	1954	pct. 54 of 53
January	201	169	84.0
February	183	167	92.1
March	204	180	88.2
April	196	202	103.0
May	189	201	106.3
June	184	200	108.6
July	185	214	115.6
August	187	207	110.6

Oil Country Goods

Thousands N. T.

	1953	1954	pct. 54 of 53
January	157	207	131.8
February	156	189	121.1
March	172	208	120.9
April	176	212	120.4
May	164	197	120.1
June	168	214	127.3
July	153	190	124.1
August	155	203	130.9

Plate

Thousands N. T.

	1953	1954	pct. 54 of 53
January	713	571	80.0
February	658	529	80.3
March	707	543	76.8
April	650	457	70.3
May	697	441	63.2
June	614	420	68.4
July	587	375	63.8
August	585	364	62.2

Heavy Struct.

Thousands N. T.

	1953	1954	pct. 54 of 53
January	418	473	113.1
February	395	437	110.6
March	416	436	104.8
April	414	383	92.5
May	416	352	84.6
June	397	372	93.7
July	413	349	84.5
August	390	325	83.3

Turn Page

This alloy list keeps getting longer and longer!

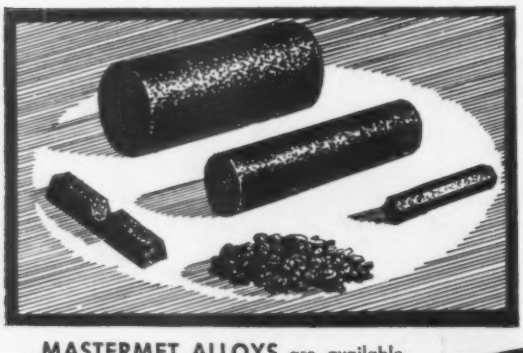
Cannon-Muskegon can supply scores of special and standard alloys for remelt or reprocessing, certified to your exact specifications

*NI RESIST
SAE 1020
SAE 4130
SAE 52100
SAE 6150
SAE 8630
AMS 5382B
AMS 5385B
AMS 5388
PWA 651
ARMCO 17-4-PH
4750
AISI 300 SERIES
AISI 400 SERIES
*MONEL
*INCONEL
ACI-H7
18-4-1
IIB2
IID2
INVAR
CO-CR-W ALLOYS
CU-NI ALLOYS
NI-CR ALLOYS
NI-FE ALLOYS
NI-CR-FE ALLOYS
CR-FE ALLOYS

*©International Nickel Co.

A *long* alloy list is an excellent indication of long alloy experience! As source for many of the nation's major investment casting suppliers and others, Cannon-Muskegon furnishes a great variety of alloys for remelt or reprocessing. Alloys include super stainless and tool steels, as well as nickel and cobalt-base alloys. Other alloys are prepared specially for medical, aeronautical, electronic, industrial and experimental uses.

These alloys are in addition to a wide range of carbon and 300 and 400 series stainless steels regularly carried in stock for *immediate* delivery. Remember . . . no matter what type alloy you specify each is backed with a notarized metal analysis insuring *exactly predictable* physical, chemical and electrical properties.



MASTERMET ALLOYS are available in either ingot, shot, hexagon bar, billet or 12"-long, 6" diameter cast round bar form. Alloys are shipped in drums with specifications clearly imprinted for fast selection and storage.

WRITE for your copy of New MasterMet Bulletin and technical data on the complete MasterMet alloy service.

Cannon-Muskegon
CORPORATION
2889 Lincoln Street • Muskegon, Michigan

MASTERMET

METALLURGICAL SPECIALISTS

PRODUCTION

C.R. Sheet

Thousands N. T.

	1953	1954	pct. 54 of 53
January	875	920	105.1
February	811	771	95.0
March	966	754	78.0
April	1001	728	72.7
May	1012	778	76.8
June	955	847	88.0
July	976	643	65.8
August	949	645	67.9

H.R. Sheet

Thousands N. T.

	1953	1954	pct. 54 of 53
January	669	558	83.4
February	599	501	83.6
March	687	475	69.1
April	691	473	68.4
May	687	482	70.1
June	660	533	80.7
July	685	427	62.3
August	669	413	61.7

H.R. Bar

Thousands N. T.

	1953	1954	pct. 54 of 53
January	853	569	66.7
February	778	548	70.4
March	894	546	61.0
April	837	479	57.2
May	872	493	56.5
June	843	531	62.9
July	793	443	55.8
August	749	446	59.5

C.F. Bar

Thousands N. T.

	1953	1954	pct. 54 of 53
January	209	113	54.0
February	200	99	49.5
March	216	105	48.6
April	210	95	45.2
May	197	95	48.2
June	203	107	52.7
July	166	76	45.7
August	180	88	48.8

Cold Rolled Strip

Thousands N. T.

	1953	1954	pct. 54 of 53
January	190	122	64.2
February	167	112	67.0
March	205	111	54.1
April	194	99	51.0
May	187	93	49.7
June	189	106	56.0
July	150	74	49.3
August	188	94	50.0

Hot-Rolled Strip

Thousands N. T.

	1953	1954	pct. 54 of 53
January	202	126	62.3
February	183	116	63.3
March	210	120	57.1
April	206	111	53.9
May	214	125	58.4
June	209	140	66.9
July	160	95	59.3
August	195	108	55.3

Semi-finished

Thousands N. T.

	1953	1954	pct. 54 of 53
January	240	135	56.2
February	220	132	60.0
March	281	125	44.4
April	252	125	49.6
May	250	110	44.0
June	250	129	51.6
July	244	91	37.2
August	201	119	59.2

TITANIUM: Techniques Show Progress

Symposium attendance surpasses predictions . . . Report new methods in fabrication of parts . . . Aircraft fasteners show promise . . . Show extrusions, powder parts . . . Still seek better quality—By *T. M. Rohan.*

♦ FIRST national symposium on titanium was held by the National Aircraft Standards Committee of Aircraft Industries Assn. in Cleveland last week. Over 300 showed up from all parts of the U. S. and Canada for the exchange of information, topping expectations by 50 pct.

These included mostly metallurgists, who know the characteristics and properties; producers, who know the pitfalls and remedies in processing; and the finishers, who have a vast storehouse of equipment and experience in forging, cold-heading, extruding, machining, and heat-treating conventional metals but who are only just getting their feet wet in titanium.

A few highlights of the meeting were:

Battelle Memorial Institute, Columbus, O., has been awarded a $1 million contract by the government for titanium research and to provide a free titanium consultation service to industry.

Double melting in a vacuum and sonic tests of billets for defects are now standard procedure by Titanium Metals Corp. of America to eliminate imperfections.

See Major Switch

Forged titanium hydraulic fittings which will withstand the highest pressures and torques involved in current aircraft practice can be put on a production line basis by The Weatherhead Corp. Tubing development, however, has been held back by lack of good quality tubes, present samples exhibiting internal cracks to 0.006 in.

Aircraft producers will probably start a major switch to titanium bolts when they can be assured specifications will be met, especially on fatigue tests. Clearances on specifications are prolonged and costly and a central clearing agency to handle these was suggested. Six months deliveries of titanium on some products are also holding back development.

Titanium bolts are being used on regular production models of Chance Vought Aircraft although bulk of use is on experimental models. Total finished titanium weight on some Convair models is about 400 lb.

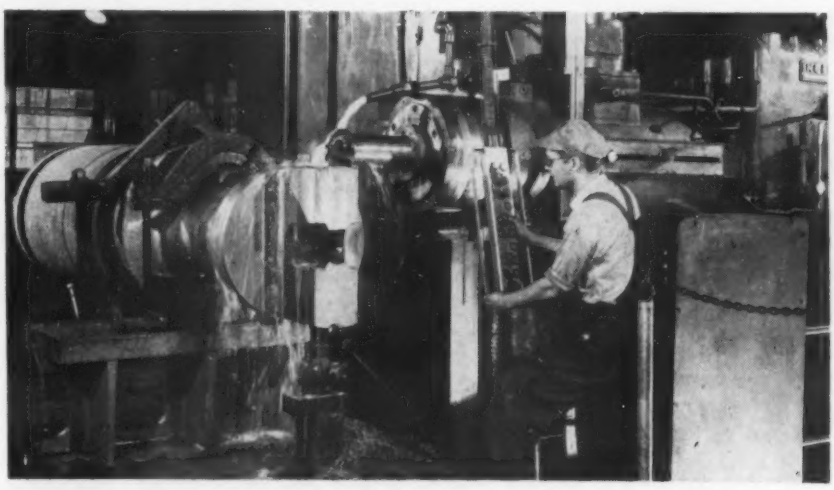
Develop New Alloys

Some titanium producers tended to blame finishers for wandering from recommended procedures causing defects. Ward Minkler of Titanium Metals said grain size can be reduced when work is done at 1400°F and some bolts headed at 1700° have failed in practice. Poor root radius and laps, notches and seams are generally due to roll-threading procedures and have resulted in thread fractures. Too much hydrogen pickup in treating also has caused failures.

He said extruded bolts continue to show promise and alloys for rivets are being developed. Titanium Metals, he added, currently has a major development under way for a heat treated titanium alloy which will be available soon.

The eddy current concentrator, an old trick in heading practice is a good gimmick for induction heating of titanium bolts, P. D. Frost of Battelle Institute said. This copper sheath concentrates the power where necessary for maximum efficiency.

A new 3 pct manganese titanium alloy is now in production at Battelle which can be heat treated to very high strengths, eliminates brittleness and results in strength of over 200,000 psi. Treatment involves aging at 800°F or over for controlled periods for combinations of strength



BIG SAVINGS in machining time are expected to result from this big vertical milling machine at Mackintosh-Hemphill plant at Midland, Pa. Mack-Hemp engineers look for ultimate savings of 80 pct on machining of massive castings. Machine is milling 14-ft blooming mill roll weighing 40,000 lb, can handle rolls weighing 85,000 lb, 18 ft long and 56-in. in diam.

and ductility. Besides the 3 pct manganese the new alloy contains 1 pct each of iron, chromium, vanadium and molybdenum.

Harvey Machine Co. took the occasion to announce commercial availability of extruded titanium shapes. G. A. Moudry, chief metallurgist, said his firm is now taking orders for standard angles, T and H-sections with machined surfaces to aluminum tolerances. Tentative prices are under $25 per lb but a lower figure is expected when arrangements can be made to use cast ingots.

Use Powder Process

Use of heavier presses in the 3000 to 4000-ton range rather than the 1650-ton aluminum extrusion presses now being used will also lower the price, he said.

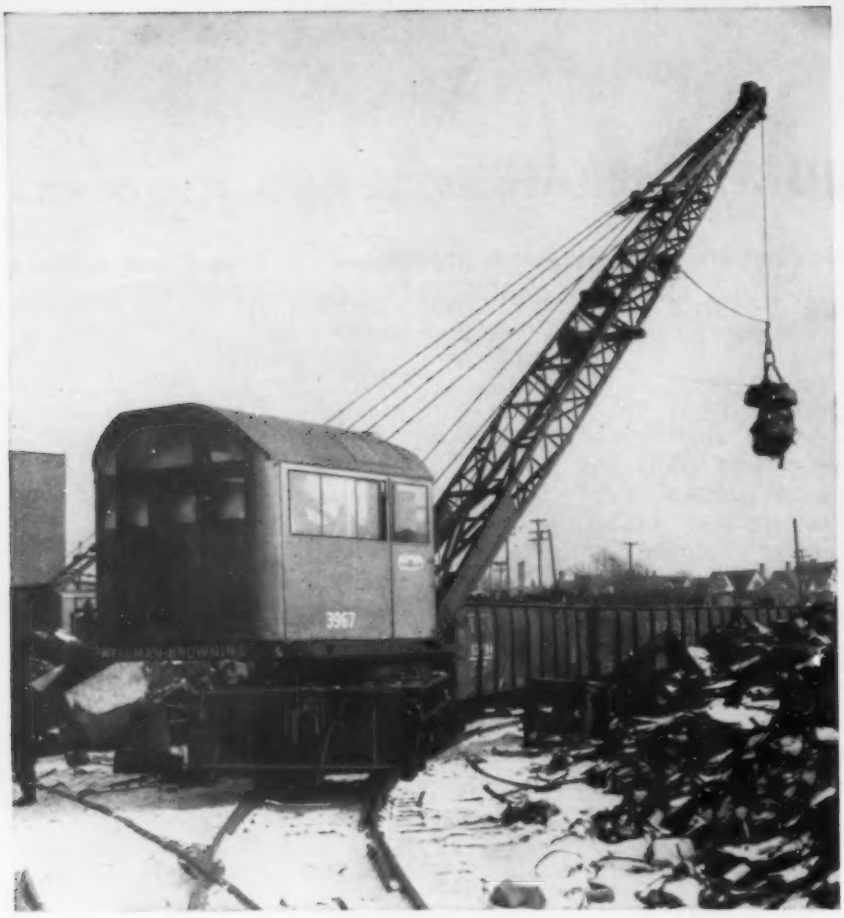
Chase Brass & Copper Co. also exhibited an extruded T-section at the show as well as tubes, rod and wire.

Rods, tubing and small aircraft parts have been successfully made of powdered titanium by Brush Laboratories Div. of the Clevite Corp., Cleveland, according to K. B. Sadler. One small aircraft rod housing was made at 20 pct less cost than any other method.

Two setups are used: the hot-press method for small lots and press-forming for large quantities. In the hot-press method, moderate press pressure is used and graphite dies with 1/16 in. tolerance. Parts to 125 lb and 9-in. diameter have been made which would normally be cast.

In press forming, blanks are pressed and sintered in high vacuum, then put in tool steel dies and formed, followed by a high vacuum anneal. Only finish machining is required on some parts. In general, the more intricate the part, the greater the saving by this method. Yield is about 1 lb of finished part for 1.7 lb of sponge.

Aircraft rivets have been cold-headed and cold upset with conventional equipment by Olympic Screw and Rivet Co. of Downey, Calif., according to H. S. Benner. Output has hit about 100 per minute.



Does the job faster... at lower cost!

Here's how...Check into the exclusive features of the Wellman-Browning Locomotive Crane and you'll see how it gives you:

Greater switching power. Drawbar pull is unsurpassed due to exclusive Torqflo hydraulic drive.

Smoother performance of hoist, swing, boom hoist and travel motions because of Torqflo and Metered Air Controls. Finger-tip control varies speed and power . . . eliminates jerks and shocks. Result:

Lower-cost operation. Gets the jobs done faster. Reduces wear on clutches, brakes, cables. Cuts maintenance costs.

● You can't beat a Wellman-Browning Locomotive Crane for output, versatility and long life! For details, write Wellman-Browning Locomotive Crane Division, The Wellman Engineering Company, 7024 Central Ave., Cleveland 4, Ohio.

WELLMAN

WELLMAN-BROWNING

LOCOMOTIVE CRANES

ANNIVERSARY: Strut Your Stuff

Company birthday is a good time to show customers and public what you can do . . . Cincinnati Milling Machine's 70th anniversary is a good example of careful planning and hard work—By *E. J. Egan, Jr.*

♦ IT TAKES a young, enthusiastic spirit to climax a busy company birthday party with a circus performance including band music, clowns, ringmaster, popcorn, firecrackers and soda pop. The Cincinnati Milling Machine Co., 70 years old this month, effectively used this form of showmanship to kickoff its big birthday celebration.

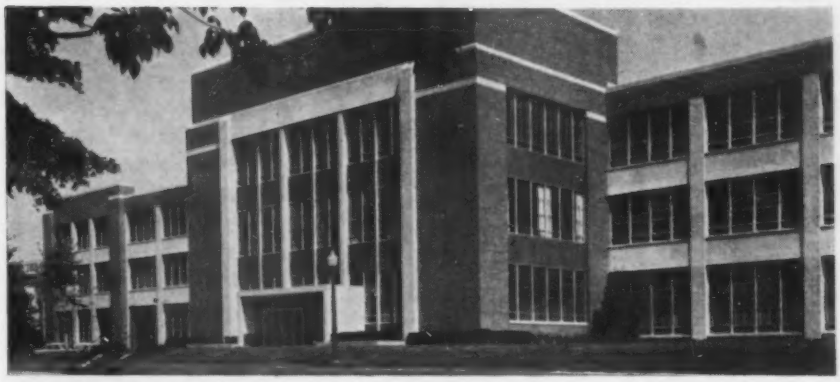
The giant affair, which was in the planning stage for 6 months, will continue until late in the year. Business paper editors got a preview of the festivities on Oct. 7.

The official celebration got underway Oct. 8 and 9 when company sales representatives assembled for an international sales conference and a look at half a dozen new machine tool models. As the salesmen departed, special customer groups began arriving for an entertaining and educational look at new buildings, new products and new ideas dedicated to metalworking progress.

Accent on Progress

While the festive birthday program continues, other customer, technical society and industrial groups will tour the firm's facilities. They will have ample opportunity to measure the record of progress since the tiny Cincinnati Screw & Tap Co. split in 1884 to start the present world famous concern.

Emphasis on a 70th anniversary might seem somewhat unusual since the milestone isn't tied in with the conventional precious stone or metal symbols. But "The Mill's" officials are making the number "70" significant in their own way. They're marking it as their take-off point to a new era of peacetime progress. And they're displaying plenty of evidence to back their optimistic views.



MODERN new technical training center of Cincinnati Milling Machine Co.

The birthday tour of the firm's modern, efficient Cincinnati headquarters is measured in miles of travel, could take several days for a detailed inspection. But the typical guest makes most of his one-day trip in small motor-powered trains. Comfortable, miniature railroad cars are equipped with loudspeakers to relay the comments of well-informed guides.

The tour guest soon realizes that the company's name doesn't begin to tell the full story of its present day activities. Of milling machines in all types and sizes the visitor sees evidence aplenty. But a sizeable portion of the firm's current business is accounted for by other basic machine tools and related products.

Stress Training

The full product lineup also features vertical and horizontal broaching machines, grinders of cylindrical, centerless, tool and cutter types, and specialized equipment such as transfer machines, Hydroform presses and Flamatic hardening machines. Lathes and drilling equipment also make the lineup through the parent company's close association with the Cincinnati Lathe & Tool Co.

Along its growth path, "The Mill" also started making Cincinnati grinding wheels and Cimcool cutting fluids. It now houses these operations in a building whose walls have been pushed back regularly to make room for new equipment and increased production.

Even the most casual visitor to Cincinnati Milling would be struck by the emphasis the firm places on employee training, product and process research, and customer service.

Always of major importance in company policy, the training program for apprentices and college trainees now comprises 21 separate courses, and is set up in a completely new Technical Training Center. No detail has been overlooked in equipping the center with shop and inspection equipment, classrooms, a technical library and a spacious auditorium. Some 275 students are presently enrolled in the center's on-the-job training courses.

Seek Better Methods

A quick tour of the firm's ultra modern research laboratories conveys the impression that these workers aren't hampered by a lot of ground rules. Research person-

nel get the best of everything in equipment, including an electron microscope, an analog computer and a radioactive tracer laboratory. Armed with such tools and the ability and imagination to use them, project workers can and do start out to "let the chips fall where they may."

And if there are no chips (metal, that is) indicated by research findings, management doesn't mind at all, simply turns the development over to its new Process Machinery Div. Officially only seven months old, this special machinery unit concerns itself solely with metal-working operations that do not involve metal removal to form a part.

Check All Fronts

Responsibility for future development of the company's Hydroforming and Flamatic processes has been assigned to the Process Machinery group. Currently, the division is also engineering a powerful unit to form parts by a metal flow process like spinning.

But company officials recognize that it is not enough to keep production, research, development and training up to date. The big payoff comes only when prospects make the move that converts them to customers—when they dispose of obsolete equipment and ideas to make room for the new.

Frederick V. Geier, company president, pointed out the heavy inertia associated with obsolescence. In his opinion, capital equipment manufacturers have only begun to battle this problem.

To help the fight to displace overaged, inefficient machine tools, Cincinnati Milling has produced an animated color cartoon film. Titled "William Johnson and the Draggin," it tells the story of the "dragging" menace of obsolescence.

To speed the conquest of the "draggin" of obsolescence on U. S. industry, Cincinnati Milling unveiled several new machine tools at its birthday party. These included a new line of heavy duty HyPowermatic milling machines, a Toolmaster milling machine, a new No. 2 centerless grinder, a new No. 0 centerless grinder and a new No. 1 cutter and tool grinder.

DEFENSE

Aircraft:

Air Force orders supersonic fighters, bombers.

Disclosure that the Convair B-58 medium bomber and the Lockheed F-104 lightweight fighter — both supersonic—are on order by the Air Force followed almost immediately a statement by Navy Secretary Thomas that Russia has planes capable of flying faster than sound and delivering the atomic bomb.

Though this assertion was met with skepticism in some military circles, it pointed up an apparent need for U. S. aircraft which can perform bombing missions at supersonic speed and others swift enough to outmaneuver hostile, high-speed bombers and fighters.

Hit 1000 Mph

This need presumably would be met by the B-58 and the F-104 when enough of them are produced to equip operational Air Force units. An unofficial estimate is that the B-58 will fly at around 800 mph and the F-104 at as much as 1000 mph.

Power-plants of the B-58 will be four General Electric J-79 engines producing 15,000 lb of thrust each. This plane is expected to replace the 600-mph B-47 Stratojet.

Order $1.2 Billion

The bomber, which may take to the air next year, will be built at Fort Worth, Tex. Lockheed will build the F-104 at Burbank, Calif.

Awards of orders for these planes raise the total amount of Air Force contracts for aircraft and related gear to more than $1.2 billion since July 1, Air Force Secretary Talbott says.

FIRING Battalion Antitank (BAT) 106 MM recoilless rifle system, M-40 at Aberdeen Proving Ground.

Build Ammo Plant

Part of the work planned for the new, $8-million plant to be constructed for the Army at Rocky Mountain Arsenal, Denver, is the production of nerve gas ammunition.

Omaha Engineer District of the Corps of Engineers will be responsible for the construction job. Estimated cost of the new buildings alone is $3.75 million.

Atoms:

Start studies of atom-powered carrier

Initial steps in providing the Navy with its first nuclear-powered aircraft carrier are being taken but Defense Secretary Wilson says it is not intended to start construction immediately.

Navy efforts to get this project underway last year were blocked by Secretary Wilson for budgetary reasons.

Three *Forrestal*-class supercarriers now are being built. It is considered possible that a vessel in this class may become the first surface ship to use atomic power.

Development of an atomic reactor powerful enough to propel a ship as large as a carrier is being undertaken by Westinghouse Electric Corp. under a new $1.25 million contract. Funds will be spent in this fiscal year under joint sponsorship of the Navy and AEC.

The pressurized water reactor type has been selected for this study.

Work on the new project is to be performed at the Bettis plant in Pittsburgh, operated for AEC by Westinghouse.

Also disclosed by the government is the information that two shipbuilding firms are making design studies of large vessels which might be atom-propelled. Performing this work under Bureau of Ships contract are the Newport News (Va.), Shipbuilding and Drydock Co. and Bethlehem Steel Co. at its Quincy, Mass., yard.

Report To Management

If you've been following the predictions of the rule book economists you know that they've tabbed the next 14 months as a period of economic stability. They speak of seasonal factors as being the major influence in determining the ups and downs of economic activity during the rest of this year and throughout 1955 as well.

Some of their predictions: They look for a normal pickup in the steel operating rate with production during the current quarter averaging about 72.5 pct of capacity. For 1955, they don't expect the steel rate to rise much above 75 pct. And as steel goes, so goes the nation.

Reasons the conventional economists give for their conservative outlook: They expect railroad steel buying to continue at a low level; look for a slowup in orders from the oil and gas industries; believe auto buying will be only moderately good; see possibility of construction losing some of its vigor.

But in the rough-and-tumble of the postwar years, a new school of economists has emerged—though they're not really economists in the classic sense. They're inclined to put more reliance on the "feel" of the economy than on the standard business indexes. They put stress on what business leaders tell them at lunch; place greater importance on the influence of international developments on the economy; figure future defense budgets won't necessarily be smaller.

This finger in the wind approach is admittedly risky. It leaves the new school economists completely unprotected because they have no hedge if their forecasts fall flat. But the fact is that in past 5 or 6 years you could count more on the reliability of these maverick economists than on the business school boys.

This was the year the Yankees lost the pennant. It could also be the year the law of averages catches up with the mavericks. But as a businessman, you can't afford to overlook what they're saying about the economic outlook. You have to at least consider their views in making your plans.

Their views on '55 are in many ways similar to those held by the conventional economists—only more so. Both see the economy uptrending from '54, but the mavericks believe the rate of rise will be sharper.

They point out that the economy has been recovering from an inventory recession on its own. Now they believe new strength will be superimposed on this trend because of heavier defense outlays.

They believe German rearmament will have substantial impact on American industry. They point to the fact that in fiscal '55, Defense Dept. will place orders for around $19 billion worth of hard and soft goods, more than twice the amount committed last year. And they figure we'll be spending more money to build up Spain's military potential too. Formosa is also a factor.

These less conventional economic forecasters say the Administration can't continue to show economy in defense spending by using up unexpended balances previously appropriated by Congress. They know new appropriations will have to be made soon and believe they'll be considerably bigger than most people think.

Specifically the mavericks look for the steel operating rate to run between 75-80 pct during the current quarter, believe it will average more than 80 pct throughout '55. They are sure of heavier steel buying by the railroads; believe the strong competition in the automotive industry will put pressure on consumers to give up their old cars for 1955 models. They're certain construction activity will continue near its current record rate. These are the reasons they are confident the economy is in for a strong uplift. What it means to you is: Don't be too conservative in making your business plans for 1955—the mavericks have been right in the past.

INDUSTRIAL BRIEFS

Purchased . . . Pressed Steel Car Co., Inc., purchased the assets of Clearing Machine Corp., Chicago. The terms of the acquisition were approved at a special meeting of Clearing Machine's stockholders in Chicago.

Training Program . . . Executive Services, 1040 National City Bank Bldg., Cleveland, is offering a 3-week seminar in linear programming, Nov. 1-19, at the Hotel Cleveland.

Producing . . . International Nickel Co. of Canada Ltd. has started production of electrolytic cobalt at its Port Colborne, Ont., refinery.

Good Work . . . Employees of General Electric Co.'s plastics department have worked over 2½ million accident-free hours in the past year. This topped the previous safety averages established by the department.

Open Branch . . . Toledo Steel Products Co. and Thompson Service Sales, both service divisions of Thompson Products Co., Cleveland, have opened a joint factory branch in Birmingham to handle Thompson truck and auto replacement parts. Floyd W. Chappell is manager.

Docks Completed . . . Contracting division of Dravo Corp., Pittsburgh, completed docking facilities for barges that will deliver some 3.1 million tons of coal annually to the Kyger Creek Plant of the Ohio Valley Electric Corp.

Contributed . . . Trailmobile Inc. contributed $50,000 to the program of the A.T.A. Foundation of the American Trucking Associations Inc., to foster and promote more comprehensive public understanding of the truck industry.

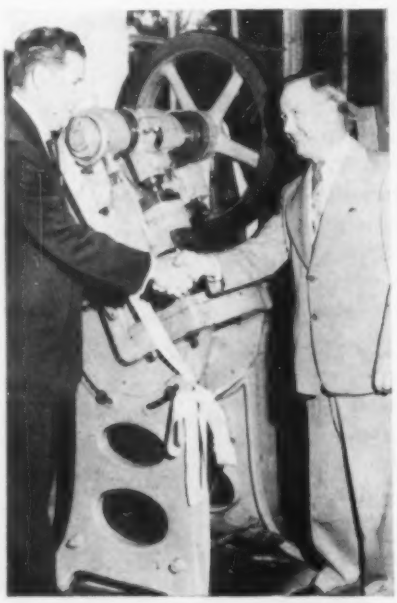
Elected . . . National Assn. of Sheet Metal Distributors elected Lee J. Haines, Souther Iron Co., St. Louis, president at its annual meeting held in Atlantic City.

Mill Depot . . . Wolverine Tube, Div. of Calumet & Hecla, Inc., has opened a new bonded mill depot to serve the customers in the Rochester, N. Y., area.

Distributor . . . Kaiser Aluminum & Chemical Sales, Inc., appointed Alloys & Chemicals Mfg. Co., Inc., Cleveland, a distributor of standard alloy ingot.

Established . . . Garrett Corp. of Los Angeles has established permanent eastern headquarters at 261 Madison Ave., New York.

Rep Appointed . . . Insul-Mastic Corp. has appointed Carter-Bearden Co. as its representative in the Atlanta, Ga., area.



OLD PRESS retired. Peter Zurles, Lake Mfg. Corp. (right) congratulates G. T. Coovert, V & O Press Co., at ceremony marking retirement of V & O press that has been operating at Lake since 1892.

New Quarters . . . Earle M. Jorgensen Co. has transferred its sheet and strip slitting activities to its main location at 10650 South Alameda St., Los Angeles.

Production Extended . . . Production of the J-48 turbojet engine which powers carrier-based fighter planes has been extended by the Navy. The J-48 Turbo-Wasp engine, built at Pratt & Whitney Aircraft's East Hartford, Conn., plant powers the Navy's Grumman F9F-5, F9F-6 and F9F-8 fighters.

Adds to Line . . . Challenge Machinery Co., Grand Haven, Mich., added Clovis Black Granite Surface Plates to its line of precision equipment.

Prexy . . . Porcelain Enamel Institute elected Glenn A. Hutt, vice-president, Ferro Corp., Cleveland, as its president for a 2-year term.

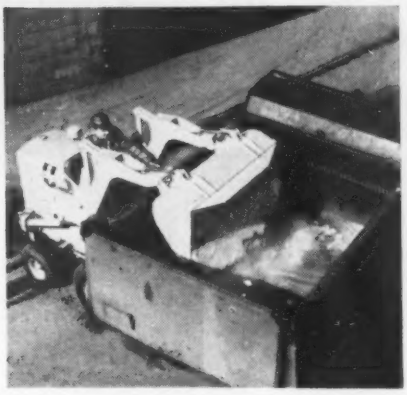
Plant Completed . . . Hitchiner Mfg. Co., Milford, N. H., has completed a plant expansion program which is expected to increase the company's production capacity by 50 pct.

Producing . . . Wyandotte Chemicals Corp.'s new Los Nietos, Calif., plant of its J. B. Ford Div. is now in production. The plant is located at 8921 Dice Rd.

They've Moved . . . The Wickwire Spencer Steel Division of The Colorado Fuel and Iron Corp. has moved its Realock Fence Dept. to East Williston, L. I., from its New York district sales office at 575 Madison Ave. The new offices are at 333 Hillside Ave.

New Models . . . Mack Trucks, Inc., New York, has 20 new models set for production. The first of these new models are scheduled to be introduced early in 1955.

Higher dumping clearance of 4'6" under lip (6'8" under hinge) puts higher equipment, bins and hoppers within convenient reach.



Flared 55" wide bucket lip and full 45° bucket angle when in dumping position (both greater than other loaders) aid discharge.

Reaches higher and farther

to bring you lower bulk handling costs

Dumps over edges to 6' 8" high, reaches up to 4" farther; 45° dumping angle aids discharge

The extra reach and clearance of the Jaeger Auto-Scoop make it possible to dump into higher bins, hoppers, trucks . . . to place loads accurately, where you want them. 4'6" clearance under bucket lip, 6'8" under hinge and longer reach of 2'7" are all greater than comparable 12 cu. ft. scoop loaders.

The Auto-Scoop easily handles 1200 lbs. (up to 20% more than other loaders of its size) at all dumping heights and positions. Boom arms and bucket are under finger-tip hydraulic control. Double-acting pistons dump and retract the bucket, discharge fast or slow as needed, enable operator to reach over edge of bins, dump and retract before returning, and can rack or shag bucket clean of sticky materials. Flared 55" wide bucket lip and 45° dumping angle insure cleaner, faster discharge.

Specifically designed for most efficient scoop loader operation, the Auto-Scoop also offers shortest turning radius (6'6"), greater power (33 hp @ 1800 rpm), up to 25% faster speeds, lowest bucket tilt-back, lower carry and other features that contribute to overall gains in production. Write for Catalog L12-4 and name of distributor who sells and services the Auto-Scoop in your city.

(Comparisons based on other well-known scoop loaders now in the field).

Extra inches provided in both forward and vertical positioning help operator spot loads accurately, with minimum effort.

Drums, bags, small parts and many other materials are also economically handled. Here the Auto-Scoop also stacks its load.

For bigger work, Jaeger offers the 1 cu. yd. Load-Plus, with torque converter, power steering and either front-wheel or 4-wheel drive.

The Jaeger Machine Company, 610 Dublin Avenue, Columbus 16, Ohio

JAEGER LOAD-PLUS *auto-scoop*

AIR COMPRESSORS • PUMPS • MIXERS • PAVING MACHINES

Distributors throughout U.S. and Canada and Principal Cities of the World

AUTOMOTIVE ASSEMBLY LINE

GM, Chrysler Reveal Many '55 Changes

Debut of '55 models has biggest advance billing . . . Chrysler spends $250 million on model changes, hopes for 20 pct of next year's market . . . New Chevy blends power, style economy—By *R. D. Raddant.*

◆ ANYONE driving along Detroit's Lynch Road today can see no fewer than several hundred brightly colored, 1955 Plymouths directly across the road from the Plymouth plant.

Eleswhere around the city, truckloads of Plymouth "Forward Look" bodies, uncovered and exposed to view, are moved freely and openly from the Auto Body Div. to the Plymouth plant. While perhaps somewhat less obvious, any curious Detroiter can get a look at the full $250-million, 1955 Chrysler line by exercising a little enterprise.

Furthermore, just about everything except pictures and actual horsepower ratings have been officially disclosed to the auto buying public well ahead of November 17 announcement dates. It's just about the biggest advance billing any car or group of cars ever received.

Reveal GM Strength . . . At the same time, far across the city, T. H. Keating, Chevrolet's general manager, disclosed a few, but significant details about how his division expects to keep first place solidly GM.

For one thing, he boasted that Chevrolet will be the hottest car in the market; a significant departure from previous emphasis on economy and conservative performance claims. It indicates that a new engine, new styling, and many new engineering features, will advance Chevrolet on two fronts: (1) economy of transportation, (2) the salable qualities of speed, performance, and eye appeal.

Enlarge Chevrolet Plant . . . How is Chevrolet going to maintain the leadership so confidently predicted? Partly through a tremendous modernization program that will add nearly 5½ million sq ft to manufacturing and assembly plants, representing an increase of 25 pct to plant facilities.

Says Mr. Keating, "We have greater capacity than ever before to build new engines; completely new capacity to build car frames; we have streamlined, modernized and expanded forging capacity; we have made important additions to our gray iron foundry, although it is already the world's largest, and the new Livonia spring and bumper plant will be a model for the industry."

List Chrysler's Changes . . . Returning to Chrysler's drive to regain better than 20 pct of the automotive market, here are some of the changes that have been made:

1. The "Forward Look" design for all models. This includes a wraparound windshield, different from GM's first effort.

2. New engine developments that will give Plymouth a V-8 for the first time and provide power increases up to 50 pct in some lines.

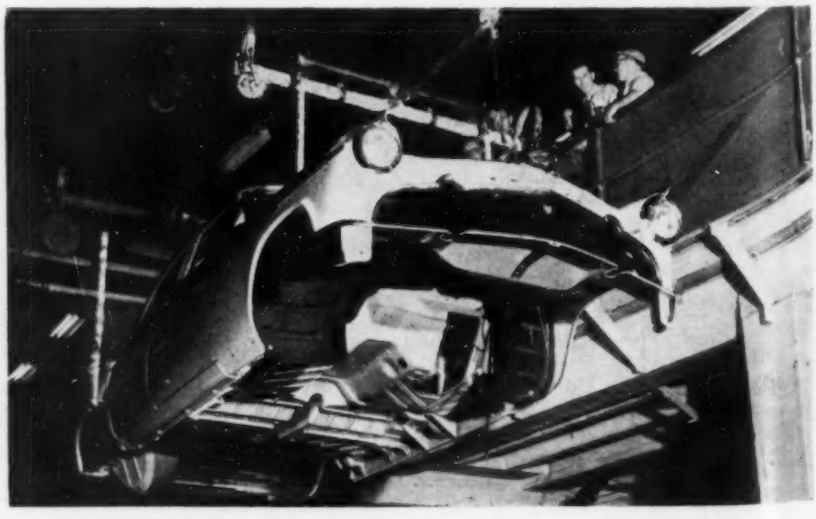
3. Control lever located on the instrument panel for all Power Flite transmission-equipped cars.

4. Redesigned suspension and frames.

Set Market Goal . . . In spite of the setbacks Chrysler has received in the past two years, L. L. Colbert, Chrysler president, expressed confidence in the 1955 market.

"Every one of our cars in every one of our five lines is new and different from bumper to bumper. The bodies are new. The interiors are new. We believe that we are the first company in the history of the industry to make a change so complete and diversified in a single year," he declared.

"To accomplish that change, to



FIRST '55 De Soto body is set down on its chassis to start line rolling.

Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
Oct. 16, 1954...	63,088*	13,450*
Oct. 9, 1954...	65,564	16,046
Oct. 17, 1953...	127,821	24,922
Oct. 10, 1953...	122,946	25,839

*Estimated. Source: *Ward's Reports*

design and prove out the new engines, to style the new bodies, to test the new chassis, to provide new facilities, to tool up and prepare the plants for production—to do all these things we have put over $250 million on the line. We are confident it will prove one of the best investments Chrysler has ever made."

Independents:

American's Romney nixes merger rumors.

One of George Romney's first jobs on assuming the back-breaking load of chairman, president and general manager of American Motors was to make—as forcefully as possible—the point that his company is not dependent on further mergers.

The door for future consolidation was not closed, but he stated American's position in a way that could leave little doubt of the present status.

"Despite all rumors, there are no merger discussions underway either directly by officers of the company or indirectly through intermediaries—nor have there been any," stated the 47-year-old executive.

Mr. Romney was appointed last week to succeed the late George Mason and to head the company's program, preside over the consolidation of the newly merged Nash-Kelvinator and Hudson forces.

Outline Product Swaps

While firmly avoiding merger considerations, he outlined a program of product reciprocity, which was actively promoted by Mr. Mason and will be expanded under the new regime.

Along this line, he refused to comment on the accepted fact that American's divisions will buy the Packard V-8. He stated that in a "unilateral" press conference he could not comment on something that should be a joint announcement. (This was considered by reporters as the neatest press conference maneuver of the season.)

He also indicated that American had manufacturing facilities to make products not provided for in Studebaker-Packard facilities, a logical example of product reciprocity that may bear fruit in the near future.

Cite Diversification Cases

"We are not in the process of diversification," he pointed out. "We are diversified." He cited the Kelvinator appliance division, the plastics division, and the Ranco subsidiary that makes heater and other controls, incidentally supplying some General Motors divisions.

He listed economies that have been accomplished since the Hudson-Nash merger. These include consolidation of body and other operations in Nash's Wisconsin plants, development of basic bodies to serve Hudson and Nash lines, savings through consolidation of purchasing, and consolidation of sales and service parts organizations. This last point, for example, saves $2 million a year through elimination of 17 parts warehouses.

Winding up some of the details of the program, here are some conclusions: The Hudson Jet may be scrapped, but both Hudson and Nash will have a car in the Jet market area. 1955 models will be introduced in staggered announcements from early December into January. The Metropolitan's future is still in the study area. Negotiations have been launched with labor to improve the company's labor cost position.

Revive Continental

William Clay Ford finally confirmed what has been an open secret in Detroit for more than a year, that Ford will introduce in 1955 a high-quality, low volume car that will be a revival of the Continental.

The Special Products Div., headed by the youngest of the three Ford brothers, will be renamed the Continental Div. New car will be a "very modern version" of the Lincoln - Continental, introduced in 1940 and continued until 1948.

THE BULL OF THE WOODS By J. R. Williams

WELL, HE SAID, "ME ARAPAHOE," AN' THEY SENT TH' POOR GUY TO ELLIS ISLAND TILL THEY COULD LOOK UP WHERE ARAPAHOE IS!
LOOK, TH' FIRST AID GUY IS TRYIN' TO GET ANDY'S MIND FAR AWAY FROM THAT FINGER HE'S GOIN' TO YANK BACK INTO JOINT!
WITH TH' HELP LOOKIN' LIKE THEY'RE TRYIN' TO ANCHOR TH' QUEEN MARY, HE'S TRYIN' TO TAKE HIS MIND OFF IT?
J.R.WILLIAMS 10-22
LIFE'S LONGEST MINUTE
Copr. 1954 by NEA Service, Inc. T. M. Reg. U. S. Pat. Off.

RACING SOUND
IS A HOT JOB
Top performance in turbo-jets and rockets
calls for alloy steels that can take it
As aeronautical engineers seek to develop greater power many barriers in the form of maximum service temperatures must be overcome.
Developing high-temperature alloy steels to withstand this heat is a special problem. And Heppenstall Company has the experience, technical knowledge, and equipment to undertake this type of job.
Heppenstall's durable high-temperature alloy steel forgings, rolled rings, and billets for drop forgings are notable developments which demonstrate the company's technical skill in meeting the latest demands of the aircraft industry.
If you have a heat problem involving high-temperature alloys, contact Heppenstall Company — they will be glad to put their knowledge and experience to work for you.
HEPPENSTALL COMPANY
Pittsburgh 1, Pa.
... for high temperature alloy forgings, rings and billets

THIS WEEK IN WASHINGTON

See Push on National Sales Tax

Administration tax experts, worried about budget deficit, may recommend that Congress vote tax on wholesale value of manufactured items . . . Democratic victory would dim chances of passage—By G. H. Baker.

♦ ADMINISTRATION tax experts are plotting their strategy for winning Congress over to a national sales tax next year. They're well aware that the idea is politically unpopular with Congress, but the nagging problem of an unbalanced budget that is getting more and more out of balance is forcing the issue into the open.

What seems likely to happen is that the Treasury Dept. will ask the new Congress to "overhaul" the entire federal excise structure. It will call attention to inequities (taxes on automobiles and automotive products still are at the high World War II rate, for example) and suggest that Congress level off the now-uneven excise rates by voting a uniform (say 5 pct) tax on the "wholesale value of manufactured products."

Tax at Retail . . . This position, if it comes to light, will be sharply challenged by retailers. The nation's merchants will make it clear that they oppose a sales tax of any description. But if it's got to come, they want it at the retailing level —not the manufacturing or wholesale levels.

In this way, the tax would be clearly identified to the consumer for what it is, and would not be a "hidden" tax as they fear it would be if it were tacked on at the manufacturing level. In addition, there would be no opportunity for "pyramiding" of the tax at each level of trade.

Some influential GOP members of the tax-writing House Ways and Means Committee admit privately that if the Eisenhower Administration should go "all-out" for a sales tax, it probably would get one. This position assumes that the next Congress will be Republican-controlled. But if the Democrats control the next Congress, the chances for a sale tax would be sharply reduced.

Uneasy Peace . . . Temporary peace has settled over Ike's cabinet in the matter of labor-management views, but it's an uneasy peace and one likely to flare anew without warning.

What's the fuss about? Briefly, Secretary of Labor James P. Mitchell is seeking Administration backing for a move to "liberalize" the Taft-Hartley law, while Secretary of Commerce Sinclair Weeks is equally determined that the law be kept as is rather than see it weakened by new erosions of state and local powers.

President Eisenhower is disturbed at the "washing of dirty linen" by the two cabinet officials in public. But he is anxious to avoid muddying the waters any further between now and the elections, and therefore will maintain public silence for the time being.

Big Fight Coming . . . However, next year's Congress is headed for a real dog-fight over proposed revisions to the Taft-Hartley law. A Democrat-controlled Congress doesn't necessarily mean that the law will be rewritten as unions demand, either. A coalition of southern Democrats and right-wing Republicans could prevent this.

Help Small Business . . . If your company is known as "one of the smaller firms" in your industry, have you found it difficult to secure bank loans? The government wants to know, and soon will send questionnaires to a sampling of small companies asking:

Have you experienced reluctance on the part of banks to lend money for expansion or working capital purposes? Did the bank refuse to lend your firm money? Why?

Object of the quiz is to determine if banks and other lending institutions are giving what the government believes is a square shake for little firms. If the results of the questionnaire show that banks are being too tough, the government's answer will be to expand the lending facilities of the Small Business Administration and the U. S. Department of Commerce.

Government Competition . . . Defense Dept., sore spot in business'

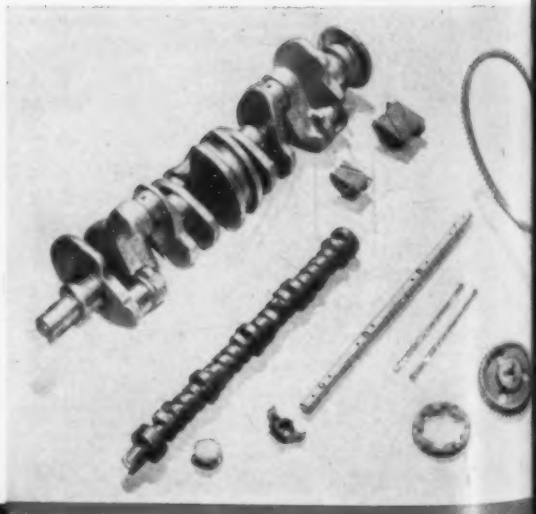
what's new?

NO. 28 OF A SERIES.

flamatic hardens crankshaft bearings

10/hr. to 70/hr.

It's no wonder the automotive industry turns to **flamatic** for selective heating precision. This machine, for example, provides the flexibility for development work on a variety of crankshafts or small lot production up to 10 parts/hour, simultaneously hardens main and pin bearing diameters in one operation. Interchangeable flame heads, adjustable flame head holders, and movable tailstock permit quick changes from one size to another . . . Another **flamatic** hardening machine for one size crankshaft hardens 70 parts/hour. Single- or multi-purpose **flamatic** machines have met production requirements on many automotive parts, a number of which are shown at the right. Write for new **flamatic** catalog, Publication No. M-1861.



CINCINNATI **flamatic**

PROCESS MACHINERY DIVISION
THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO, U.S.A.

campaign to get government out of competition with private industry, has issued new orders calling for study of ten additional manufacturing facilities in order to eliminate those in competition. This brings to 41 the number of areas now under study.

Latest activities to be reviewed under an order from top Defense Dept. officials that all unnecessary facilities be discontinued, are production of marking devices; laboratory, scientific and engineering instruments; optical instruments and lenses; ophthalmic goods; watches, clocks and parts; surgical and medical instruments and supplies; dental equipment and supplies; photographic equipment and supplies; watch, clock and jewelry repair shops; and plastic laminating operations.

The first eight categories must be studied and ended unless they are absolutely essential by next June 30. The last two studies must be completed within a year.

When the Eisenhower Administration took office, the government's stake in industrial-type facilities was estimated at $50 billion, covering more than 100 different activities.

Mobilization:

Reappraisal pinpoints weak spots . . . Stockpile manhours.

Searching appraisal now underway by Washington mobilization planners is pinpointing several weak spots in this country's preparedness planning. New orders by the top-level Office of Defense Mobilization are going to all cabinet agencies in order to tighten up mobilization plans and help spot and correct weakness by strictly delineating each department's responsibility.

Latest ODM directive is to the Defense Dept. and lists 25 areas in which the Pentagon is responsible for maintaining the nation's capacity to fight a war on a moment's notice.

High on the list for action is manpower allocation and the control policies needed in order to make sure that all needs would be met. ODM is asking each department what its manpower needs would be in an emergency, will adjust them, and draft the necessary rules and regulations to see that they could be carried out.

Store Manhours

One result of the mobilization reappraisal and the manpower problem is a shift in stockpile policies. In the past, emphasis has been on collecting stores of materials, keeping production equipment in standby condition so that arms could be produced fast.

But the planners now realize that these materials are useless if a really tight manpower shortage develops, as it probably would. So they are using the long-term stockpile to cache not only materials but manhours. The theory is that partly-constructed or fabricated parts, machines, and stored imported goods not only provide goods, but also reduce the manhours necessary to turn them out.

Split Defense Contracts

The orders to the Defense Department also contain hints that ODM — powerful voice of the President on mobilization matters —wants the Pentagon to step up its recommendations for production priorities and for dispersing sources of supply of military end items.

One plan for dispersal involves splitting contracts between three or four potential suppliers so that all will remain ready, establishing alternate sources of supplies with phantom orders, picking out secondary sources of supply (firms which would not normally be considered a prime contractor but could fill in in a pinch), and investigating the feasibility of forming industrial pools of small firms which could produce military items.

Check on Research

Full cooperation by industry is needed, U. S. Labor Dept. says, to insure success of its new sampling survey of the research and development programs conducted by American business firms at an annual cost of $2.5 billion.

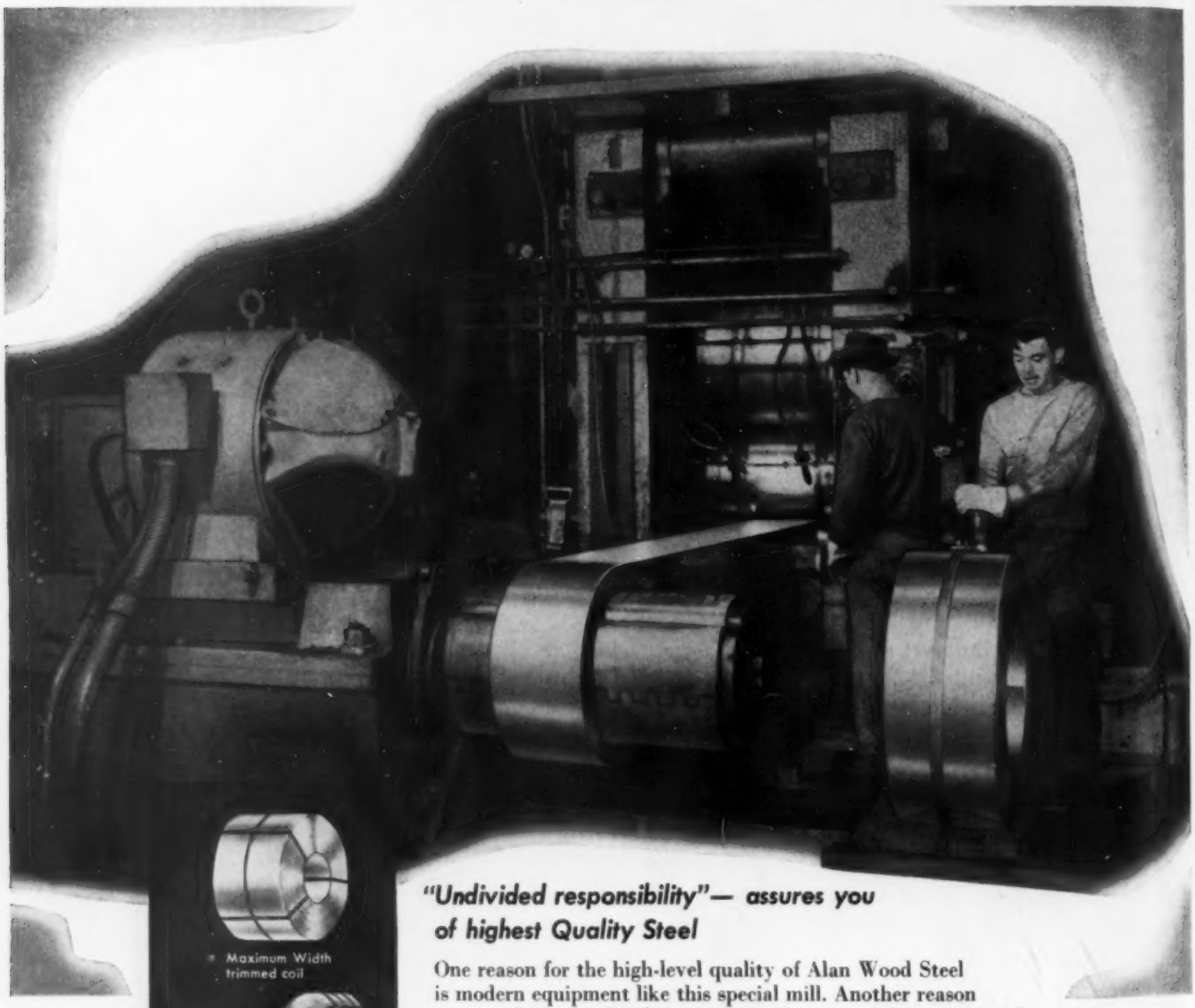
Purpose of the study is to provide material for eventual use in White House recommendations on measures to strengthen national scientific research efforts. About 200 firms will be interviewed personally, in addition to those quizzed by questionnaire.

Data on funds used and manpower employed in company programs are to be sought from every major industry. All company statistics are to be held in confidence, and information published will not identify individual firms.

GEORGE C. McCONNAUGHEY, right, is sworn in as chairman of the Federal Communications Commission by Supreme Court Justice Burton.

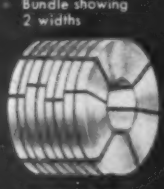
A.W.
CONTINUOUS MILL

PLATE • SHEET • STRIP—*available in hot rolled quality*



Maximum Width trimmed coil

Bundle showing 2 widths



Bundle slit to 4 widths

More than a century and a quarter of iron and steel making experience

"Undivided responsibility"— assures you of highest Quality Steel

One reason for the high-level quality of Alan Wood Steel is modern equipment like this special mill. Another reason is our policy of undivided mine-to-mill responsibility, and rigid metallurgical control that guarantees your getting the finest quality steel possible to produce . . . and getting *exactly* what you want. Coils are finished with either mill edge or slit edge in widths up to 25½ inches, in thicknesses up to .1875 inches. Coils can also be slit to any desired widths from minimum width 1 inch to maximum width 25½ inches.

Our plant location at the center of Eastern industry and transportation also makes possible faster delivery at favorable freight rates.

ALAN WOOD STEEL COMPANY

CONSHOHOCKEN, PA.

Healthy Upturn For Warehousemen

Growth of new business, expansion of established firms, spurs metal distributors... Mills sell 26 pct of tonnage to Coast warehouses, 18 pct is U.S. average . . . See best tinplate year—By R. R. Kay.

♦ STEEL WAREHOUSE business on the West Coast looks bright—brighter than in any other section of the country. Half-year figures show western mills sold 26 pct of their steel to warehouses, while the national average was only 18 pct. Western warehousemen are better mill customers than their eastern cousins.

The continuing trend of new and expanding businesses in the West spells out reason why warehousemen are doing well here. Earle M. Jorgensen, vice-president of American Steel Warehouse Assn., president and general manager of Earle M. Jorgensen Co., Los Angeles, one of the largest steel distributors on the West Coast, believes they will continue to enjoy better business than the national average.

West Grows Faster . . . Here are two good growth examples. In the period 1944-54 U. S. employment increased 13 pct, while in California it was up a smacking 27 pct. Population growth 1943-53 was 18 pct nationally; in California it was 42 pct—and they're still coming in at the rate of one person every 1.2 minutes.

Problems plaguing warehousemen in other areas haven't the same sting on the West Coast. An IRON AGE check of leading warehouses shows stable prices and practically no mill invasion. And they're hardly bothered by imports.

Find **Inventories Small** . . . Many steel users are buying again in normal patterns, Mr. Jorgensen says. Some buyers now find themselves with inadequate inventories and are scrambling to get them up to healthy levels.

What's in the cards? Pressure of competition among warehousemen in the years ahead will compel them to give the customer more and more service. They'll do a lot more shearing, burning, grinding, and slitting. This is attractive to their customers because it cuts costs of handling through several shops and reduces investment in costly machinery.

Seek Sales Boost . . . Hard-sell and tight operations is the word for the day at Kaiser Steel Corp., Oakland, Calif. Its annual report reveals $128.5 million sales, down 4.5 pct from previous fiscal year. Sights are raised to a 15 pct sales increase in fourth quarter of 1954. How to do it? Top-to-bottom tightening of sales, production, employee and customer relations.

"Swell, but where shall we deliver?"

Up Tinplate Capacity . . . By next January, Kaiser Steel will have expanded its Fontana, Calif., works. Electrolytic tinplate production will rise 75,000 tons to an annual capacity of 200,000 tons. Plate and hot-rolled sheet mill capacity will be up 120,000 tons per year. About half of the new plate and hot rolled sheet production will service the tinplate mill.

Current competitive market for plate, hot rolled sheets, and tinplate remains strong. Indications are that tinplate consumption in western U. S. and Hawaii will top the million-ton mark in 1954 for the first time in history. (See THE IRON AGE, July 22, 1954, p. 91.) This would be roughly 20 pct of the nation's tinplate market.

Hope for Shipbuilders . . . West Coast shipyards can expect a fair share of the government's maritime building program of 60 new ships per year, 1955-57. That share would be about 20 pct of the total, or 12 to 15 ships. Shipbuilding and repair people, belts drawn to nearly the last notch, got some hope for nourishment from Rep. John J. Allen, Jr. (R., Calif.), acting chairman, House Merchant Marine and Fisheries Subcommittee. His group had a first-hand look at dying facilities at Puget Sound (Wash.), San Francisco and Los Angeles.

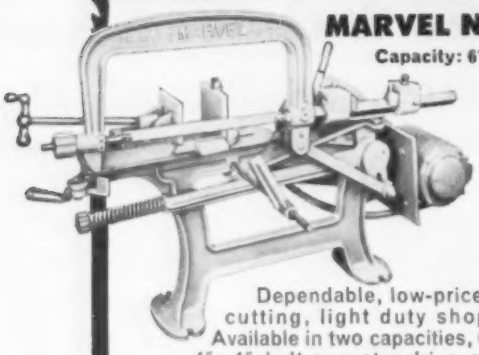
Lockheed Aircraft Corp., Burbank, Calif., reports a $9 million U. S. Navy contract for modification of P2V-5 and P2V-6 twin-engine Neptune anti-submarine planes.

WHAT DO YOU WANT IN A METAL-CUTTING SAW?
—ECONOMY, SPEED, VERSATILITY, CAPACITY

Whatever your individual requirements in metal-cutting equipment, MARVEL has it. MARVEL builds nine basic types of metal sawing machines, each available with a choice of modifications and special accessory equipment.

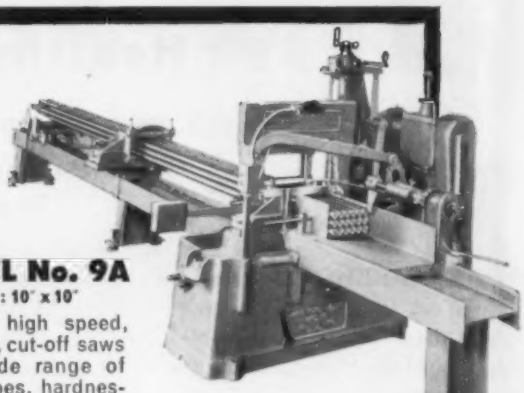
Your local MARVEL sawing engineer is competent to study your cut-off and metal sawing problems, and to make recommendations as to the most advanced methods and equipment.

MARVEL No. 2/MI
Capacity: 6" x 6"



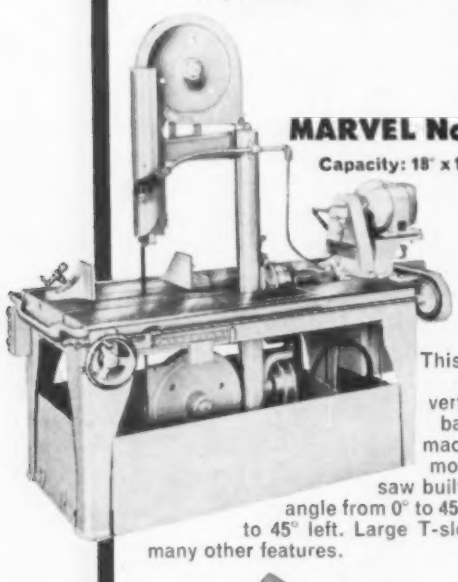
Dependable, low-priced, dry-cutting, light duty shop saws. Available in two capacities, 6" x 6" or 4" x 4", belt or motor drive, stationary or portable.

MARVEL No. 9A
Capacity: 10" x 10"



Automatic high speed, heavy duty, cut-off saws handle wide range of sizes, shapes, hardnesses and grades. Also with 6"x 6" capacity (No. 6A), or in single cut types (No. 9, No. 6).

MARVEL No. 8
Capacity: 18" x 18"



This universal, advancing vertical blade, band sawing machine is the most versatile saw built. Cuts any angle from 0° to 45° right to 0° to 45° left. Large T-slot bed and many other features.

MARVEL No. 18
Capacity: 18" x 18"

Universal, hydraulic, heavy duty roll stroke hack saw. Cuts off largest and toughest bars and billets; easily, rapidly and accurately. Trims die faces for resinking, does shanking of die blocks, etc. Also available in 24" x 24" capacity (MARVEL No. 24).

Write for catalog

MARVEL High-Speed-Edge Hack Saw Blades

Unbreakable, composite saw blades with fastest-cutting, longest-lasting high speed steel edge integrally welded to a tough unbreakable body, permit maximum speeds and feeds on any hack sawing machine. Permit tauter tensioning —increase accuracy. Outlast all other blades.

MARVEL High-Speed-Edge Hole Saws have strength not only for portable drills, but for use on drill presses, lathes, etc. Sold by leading industrial distributors.

MARVEL *Metal Cutting* **SAWS**
Better Machines-Better Blades

ARMSTRONG-BLUM MFG. CO. 5700 W. Bloomingdale Ave., CHICAGO 39, U.S.A.

MACHINE TOOL HIGH SPOTS

Small Firms Can Automate Equipment

Experts claim small manufacturers can benefit from automation . . . Note definite trend in that direction . . . Machinery price tag secondary to product's unit cost . . . What type is best—*By E. J. Egan Jr.*

♦ THE SMALL to medium size manufacturer who considers automation as being strictly for the large producer may be burying his head in the sand.

Automation experts vigorously deny that automation has no place outside of the mass production industries. And they can cite numerous examples to prove their point. To give the small manufacturer a positive example for an incentive, the experts rattle off a list of lesser known firms who have put automation to work successfully.

If the positive, "you-should-follow-the-leader" approach doesn't seem to make much of an impression, there is a scare technique the experts can use. This is the "don't-let-it-happen-to-you" theory. And there's enough truth in it to give it plenty of appeal for the manufacturing executive who responds best to the negative approach.

Notes Trend . . . One keen observer, who has no axe to grind for or against the concept as it applies to smaller industries, points out that many alert small producers in out-of-the-way locations are quietly emulating their bigger brethren in the automotive and appliance fields. These firms have their eyes on the dollar sign all right, but they're looking at it in a way that many executives haven't gotten used to.

Time was when the number of zeros to the right of the dollar sign and digits on a price tag told the story on new equipment purchases. But in this automated era the dollar sign is applied to the finished part.

Unit cost of the component part, subassembly or ready-to-ship product is the pivot on which the decision to automate should swing.

Price Tag Secondary . . . Machine tool builders and successful users of automation equipment vociferously agree on this subject. Within practical limits of the customer's ability to pay for and write off the new equipment, its price tag is only supposed to be secondary.

It can be business suicide for the small manufacturer to look at the cost of automation equipment and then discard the idea without pegging its cost saving potential. Some parts suppliers to the mass production industries have learned this lesson too late.

What's Best? . . . What kind of automation is best for the modest size metalworking plant? It may be an academic question but it is a complex one. In the long run the only answer is a specific one: the best equipment to produce the end item at the lowest cost.

One manufacturer may be able to show a maximum cost reduction by ingeniously equipping his standard type machine tools with automatic features. There are several fields he can explore, including loading and unloading, machining, gaging and inter-process handling.

In another case the best approach may involve replacing the former manufacturing methods and equipment entirely.

With the return for what passes as peacetime conditions, U. S. metalworking firms feel the pinch of competition more and more. Until something better comes along, alert managements will seek to apply whatever automation features they can to ease the pressure. A careful study of this "Automation Issue" of THE IRON AGE should be helpful to many.

"I think they bought this used even then."

Buys Plant . . . The plant of the Hendey Machine Co., well known former Torrington, Conn., lathe and shaper manufacturer, has been sold to the American Brass Co. But the firm's name, product line and service business is for sale and available through private negotiation. Several firms are reported to be interested in buying the basic line manufacturing equipment and maintaining the long established Hendey name. But all other general machinery and factory equipment goes on the auction block Oct. 26 through 28.

announcing

THE FERRY CAP

countr-bor

SCREW

A NEW, REVOLUTIONARY DESIGN
FOR SOCKET HEAD SCREW APPLICATIONS

OFFERING THESE NOTEWORTHY ADVANTAGES:

1. Takes standard 12-point socket wrench.
2. External wrenching instead of internal.
3. Stronger—more gripping surface.
4. Permits greater wrenching torque.

Packaged goods being readied for distributors

In brief—a quality product which will do everything required of socket head screws—*and more.* For all counterbore applications.

Wherever the Ferry Cap Countr-Bor Screw has been tried, users are enthusiastic—saying that these screws are a service man's dream and the best development in socket screws in recent years. They will help you lick tough assembly problems where socket screws are required.

We shall be glad to send samples, prices and complete information promptly upon request.

Ferry Cap Countr-Bor Screws
PATENT APPLIED FOR
MANUFACTURED SOLELY BY

THE FERRY CAP & SET SCREW COMPANY
2157 Scranton Road • Cleveland 13, Ohio

The Iron Age SALUTES

George A. Roberts

A top tool-steel metallurgist at 36, his enormous capacity for leadership and his exceptional ability to foster intra-industry cooperation led to presidency of American Society for Metals.

On Thursday of Metal Show Week George A. Roberts will assume the position of president of the American Society for Metals for the coming year. Congratulations will be well justified; he follows a distinguished array of metallurgists who have held down that chair.

"Chair" may not be the right word. As ASM president, George will visit some 40 or 50 local chapters, make 50 or 60 speeches, shake a few thousand hands. He'll have to name a lot of people to committees, do a little writing, award some medals.

How he'll work this in to the already crammed schedule of a tool-steel company executive is a problem that would give most people heart failure. While Doctor Roberts isn't cocky about it, you can tell from his air of quiet self-assurance that he'll take it in stride. He's had a lot of practice.

At 36 he has already been active in the affairs of half a dozen technical societies and co-authored a magnificent book on tool steels. He's written a host of technical articles, several for THE IRON AGE. Lately he's been quite busy as a national director of the Metal Powder Association because of his work on pre-alloyed steel powders.

As a committee head he's tops in isolating critical issues, gives everyone a chance to be heard. Patience and tact mask a tremendous inner drive. He wants meetings to move fast—but he's more interested in direction than speed.

George is now vice-president, technology, of Vanadium-Alloys Steel Co. at Latrobe, Pa. Like most tool-steel metallurgists, he spends a lot of time on the road. Still he finds time for the family: his wife Betty, 2 boys and a girl.

And he makes time for other work around Latrobe. He headed-up its committee to draw up a new housing code, pitches in on Little League work, has headed the Community Chest and the Junior Chamber of Commerce. He plays some golf, is a crack rifle shot.

On top of all this—or rather below it—he putters around with woodworking tools in the basement. Relax? Sure, but he likes to get a little work done before breakfast whenever he can.

How Centrifugally Cast Bushings solved quality problem for

S. MORGAN SMITH COMPANY

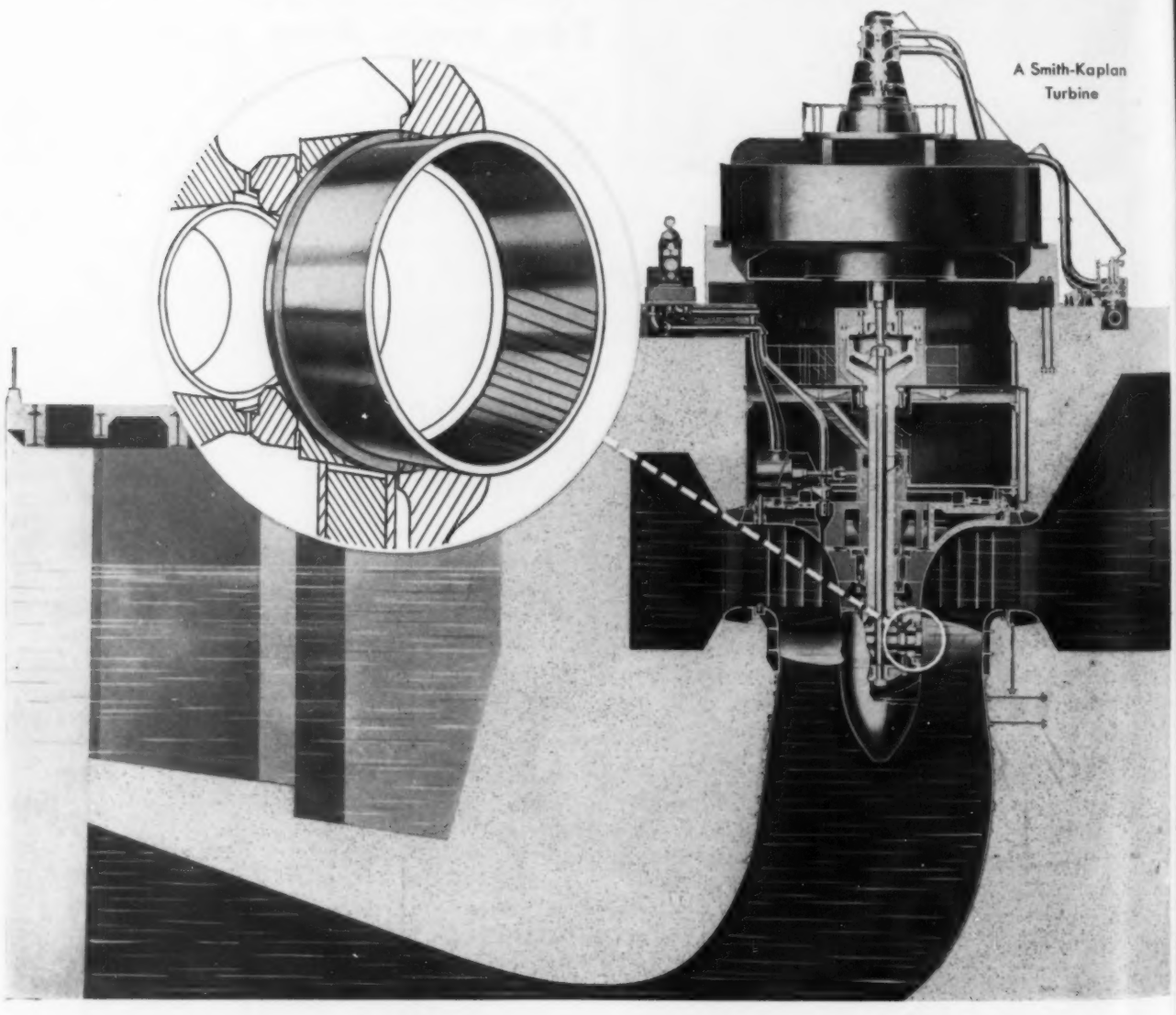
Original method of manufacture called for a bushing assembly of two centrifugal castings—basically a flange and cylinder—with flange shrunk-fit in place and pinned at eight points.

But under the self-imposed quality standard of the S. Morgan Smith Company, makers of giant hydroelectric turbines, continued research and development were indicated. It was felt that the assembly in question—a bronze bushing capable of seating and supporting a 21,000-pound propeller blade—could be improved if made as a single, centrifugally cast piece to minimize the danger of blowhole and shrinkage.

Pioneering was called for. Something that was thought impossible must be done.

And it was done by National Bearing. Research, engineering skill and a wealth of tough-problem experience were put to work. The result: A one-piece, centrifugally cast, bronze bushing capable of meeting the highest inspection standards of U. S. Army Corps of Engineers and the S. Morgan Smith Company.

If your product requires nonferrous components, why not investigate our facilities and abilities. Write to National Bearing Division for information.



A Smith-Kaplan Turbine

AMERICAN Brake Shoe COMPANY

NATIONAL BEARING DIVISION

4930 Manchester Avenue, St. Louis 10, Mo.

Plants in: St. Louis, Mo. • Meadville, Pa. • Niles, Ohio • Portsmouth, Va. • St. Paul, Minn. • Chicago, Ill.

essing to the AC spark plug shell. Prior to the adoption of a new automatic processing line four operations were performed in individual machines.

Since automation was adopted the previous operations—plus important gaging operations—are being performed automatically at a much faster rate. The station-by-station list of operations is given in the accompanying table. Use of automation resulted in a 71 pct improvement in the efficiency of the operation.

Many did the same work

Occasionally the efficiency of an operation that is already highly automated can be further improved by designing a new type machine specifically engineered to fit a specific job. An example is the assembly of a valve for AC fuel pumps. Because of large production requirements, more than 20 operators assemble four delicate parts in a ¾ in. diam metal valve cage. Parts include a spring, gasket, valve and valve seat. A conveyor carries the assembled valves to two operators who load parts on a dial-fed press for crimping.

The manual assembly operation is a 2-hand job. Girl operators have been trained to eliminate lost motion. By many standards, this operation would be regarded as highly efficient.

However, AC process engineers, noting the large number of operators performing the same work, concluded that some improvement in efficiency was possible.

A rotary type automatic machine was developed having a number of unusual working arrangements. These included: (1) Hopper-feed cage to rotary table; (2) Blank gasket from moving paper strip and fit into cage; (3) Make spring from wire and feed by tube into position; (4) Hopper-feed valve; (5) Hopper-feed valve seat: (6) Crimp. Efficiency of this operation has been improved more than 65 pct through the development of this highly automatic, efficient machine.

Broadly speaking, automatic machines may be classed as (1) straight line and (2) rotary type machines. In a straight line machine the unfinished part is introduced at one end and emerges from the other end as a partially completed or a completely finished part.

A rotary type machine has a rotating table. This permits the finished part to return, if desired, to the point where it was introduced.

It is practically impossible to classify all machines that might be properly described as automatic machines. However, the following equipment should be included:

Automatic screw machines; transfer presses; plating machines; threading, knurling and metal-forming machines; diecasting machines; automatic polishing and buffing equipment; washing and chemical cleansing equipment; painting and drying machines; special welding, swaging and heading machines; continuous paper processing and other forming facilities.

These broad classifications of equipment have one thing in common: To some degree each machine functions automatically. The degree of automation and the amount of automatic handling depends primarily on the application.

Circuitry more complex

Experience with automation has clearly demonstrated the importance of electrical and hydraulic engineers in the development of automatic machines. Electrical circuitry is more involved. Improved electrical control panels have substantially bettered standards of performance. Design of hydraulic systems and the component pumps, valves, and cylinders is becoming more complex. A much higher degree of operating perfection is expected of modern hydraulic equipment used in automatic machines.

There is a definite relationship between the product and automation. Close cooperation between engineers responsible for automation and product engineering is needed to obtain the best product at the least cost. The product engineer must keep up with manufacturing develop-

AUTOMATION CAN BE USED ALONE . . .

Spark Plug Shell

Job	Before	Feed and Loading
1	Chamfer inside	Rotary—2-hand loading, automatic rejection
2	Weld side wire	Rotary—2-hand loading, automatic ejection
3	Remove burr, inside	Alternate hand loading
4	Form inside wire and remove outside burr	Rotary—2-hand loading, automatic ejection

Job	After	Feed and Loading
1	Gage height	Automatic
2	Gage hole	Automatic
3	Remove burr, inside	Automatic
4	Open	Automatic
5	Weld side wire	Automatic
6	Open	Automatic
7	Remove burr, inside	Automatic
8	Bend side wire	Automatic
9	Remove burr, inside	Automatic

OR COMBINED WITH HAND ASSEMBLY

Radiator Cap Assembly

Station	
1	Hopper-feed screw
2	Pre-position and load cover
*3	Load retainer and spring
4	Power-drive screw and load valve housing
5	Staking operation
*6	Load valve-plate and relief valve subassembly
7	Staking operation
8	Test for spring pressure

* Manual operation. Other operations are mechanical. Physical effort required for this series of operations has been reduced more than 50 pct.

ments, particularly in his own company, if he is to understand the needs of the product and the advantages and limitations of automatic manufacture.

Often improves product quality

Automation often improves product quality by eliminating the unpredictable human factor. A radiator cap assembly machine at AC, designed and built by GM New Process Development Section, does a better job of inspecting for leakage than was previously accomplished by an operator.

Automation removed the personal judgment involved in reading a gage. Even though tighter tolerances are required, production has been increased, and costs were reduced. Individual functions performed by this automatic machine are shown in the accompanying box.

The method previously used required an operator for each station. In addition to elimination of several monotonous and tedious operations, floor space requirements were reduced and production per square foot of floor space was multiplied several times.

Improving the production efficiency of a plant is the surest means of retaining a strongly competitive position, particularly in the highly cost-conscious automotive parts industry.

When should automation be used? Here are some factors that ought to be considered in reaching a decision:

1. Will production costs be reduced?
2. Will manpower be conserved?
3. Will product quality be improved?
4. Will production per square foot of floor space be increased?
5. Will in-process inventories be reduced?
6. Will working conditions be improved?
7. Can automation pay for itself during the life expectancy of the product?

While each factor requires careful evaluation, the main objective is to reduce cost. Unless production costs can be cut, it is difficult to justify automatic processing.

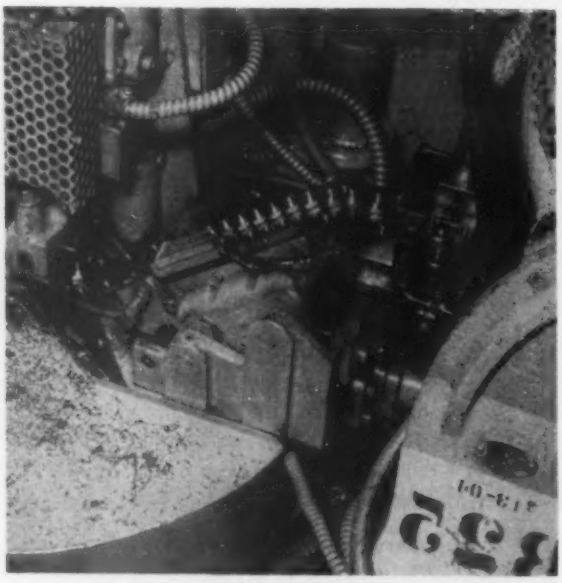
Production costs can be reduced in several ways as a result of the efficient use of automatic processing equipment. While reductions in direct labor cost may be important, a reduction in indirect labor is also important.

Improvement in paint quality, reduced cost of paint and greater production per square foot of floor space represent substantial savings. But the reduction in indirect labor cost is almost as important.

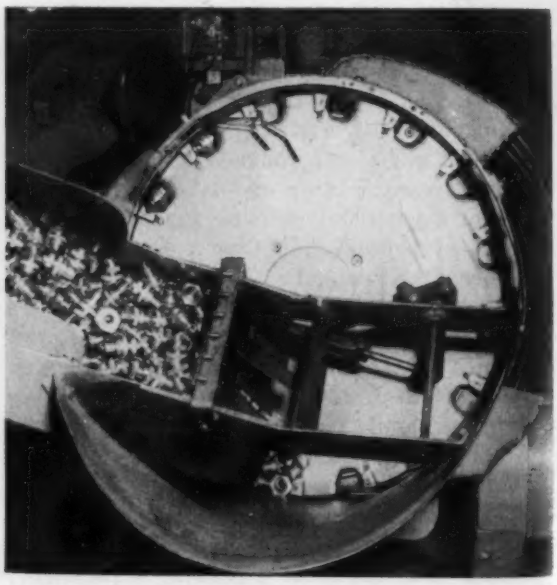
Where automatic painting was previously used, overspray was high, as much as 50 pct. Cleaning fixtures and exhaust systems was time-consuming and expensive. The new electrostatic method has virtually eliminated this large indirect labor expense item.

There are other areas of labor saving that are indirectly attributable to automation. Stock handling expense is often reduced. Process cycling time can often be cut. Reduction of time cycle required to process from raw material to finished product is highly desired by management.

While shutdowns of automatic equipment can

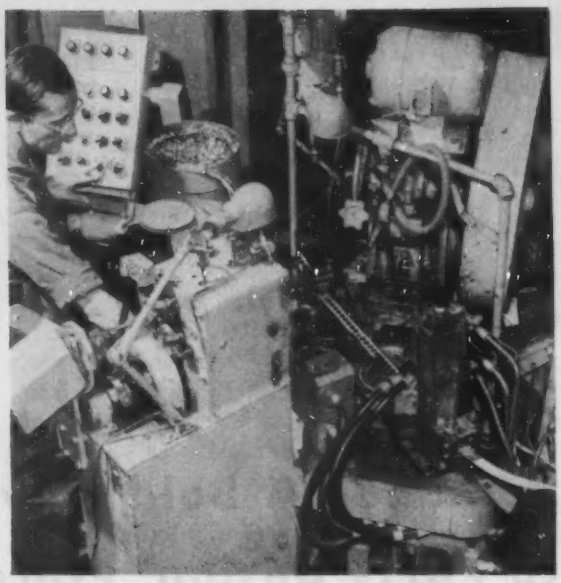


TO IMPROVE EFFICIENCY of an already partially automated thread rolling operation, a



chute feed and a mechanical hopper feed were added. Previously operation was hand loaded.

DUPLICATION of operations in assembling fuel pump valves suggested possibility for further improvement in an assembly setup generally considered efficient. Efficiency was boosted 65 pct through use of a rotary type automatic machine which combined several operations.



be a serious problem, lost time due to such shutdowns is steadily decreasing. Additional provisions built into modern machines to insure maximum availability of equipment have contributed substantially to the reduction in lost production. Meanwhile, the age-old production problem of out-of-balance stock resulting from breakdowns of a single press in a multi-press line is avoided.

Improved quality is a natural byproduct of the adoption of automatic processing. Parts must be made more uniformly. Since gages and assembly devices have no human judgment, a part is either right or wrong. There are no in-between parts. Whether the product is produced on a punch press, screw machine or cold header, parts must be uniform and held to close tolerances. Using only standard parts, the quality of the final product is invariably improved where automation is properly applied.

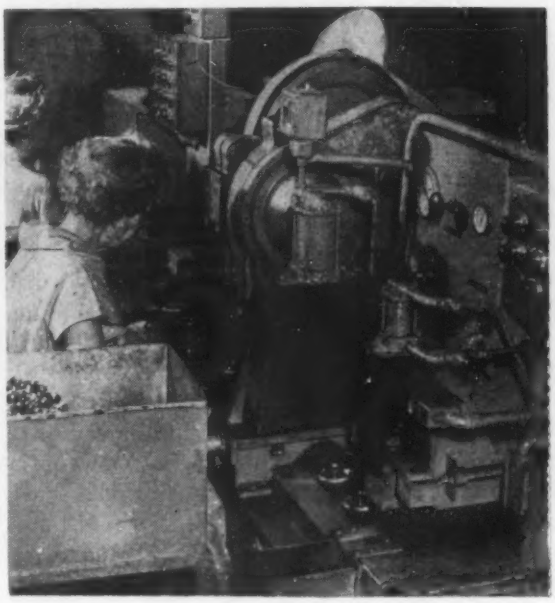
Automation may also reduce inspection costs. Many of the latest automatic inspection devices operate faster than a human worker. They never get tired and the standard of judgment remains constant.

Inventory reductions through automation may occur at several locations—in the press line, in parts accumulated between presses, in parts banked up beside a press that is temporarily down. Inventories have less tendency to get out of balance where an efficient and reliable automation setup is in operation.

The first consideration as well as the final consideration in automation is, however, will the job pay off?

To determine this it is first necessary to estimate the minimum life of the job. Let us say this is 3 years. After deducting 6 months for engineering and development, this leaves 2 years and 6 months during which accumulated savings from automation must pay off the cost of the new automatic installation.

If the machine required 9 months to build and would be used a minimum of 2 years, such an installation would be considered economical although many other factors, including (1) quality of the product, (2) rate of production, (3) availability of floor space and other considerations would have to be carefully examined before a final decision is made.



RADIATOR CAP assembly machine works at high speed, eliminates human factor in testing.

Consider the whole job—

AUTOMATION

Demands A Bold New Approach to Parts Design, Processing Methods

◆ To grasp the true significance of automation requires thinking in terms often strange to the average manufacturer . . . Visualization of potential gains resulting from automatic processing starts with the product itself . . . Daring new concepts in loading of parts, scheduling of operations, the role of machine tools and the importance of automatic subassembly are involved . . . The revolution in manufacturing methods which is affecting all industry offers new opportunities for the imaginative approach to development of both product and processes.

By C. F. Hautau, Chief Engineer
Hautau Engineering Co., Detroit

◆ SPECTACULAR gains have been made in U. S. industry through application of automation. These gains include marked improvements in product quality, sharp cuts in production costs, marked reductions in floor space required for manufacturing operations. The price of these gains is far from low; but the era of these industrial miracles has just begun.

A product designed specifically for automation may have little resemblance to your present product. The redesigned part or subassembly may be made from bar stock, for example, instead of steel stampings. One new machine may replace not only a series of machines but a whole department. Cold formng, machining, heat treating, assembly, gaging and packaging may be incorporated in a single machine.

Such machines are being built. They cost a lot of money. Engineering requirements are high. Months of construction time are often involved. Ability to dream—and to back your dream wth cold cash—is required where automation is applied. When results are equal to expectations, financial success and a strong competitive position are virtually assured.

Bold new thinking is the primary requirement for the successful application of automation. Automation must be visualized as much more than merely automatic loading and unloading of parts.

Part of the confused thinking about automation today arises from the fact that many people in the metalworking industry are inclined to think of automation only in terms of big transfer-type machine tools. Unfortunately, this concept of automatic processing overlooks the fact that final assembly of most products is usually anything but automatic. This is true of the automobile engines, produced on automatic transfer machines, and of many appliances and small subassemblies like water pumps and fuel pumps.

Assembly offers new opportunities

In many plants, assembly line workers outnumber the workers in the machine tool department by 10 to 1. The possibilities of extending automation to subassembly—combining manufacturing operations and assembly—are only beginning to be appreciated.

This late awakening is in part due to lack of imagination. More important, however, is the fact that the processing engineer is usually called in *after* the product is designed. If he can

make the parts required—using the machine tools available, fasteners acceptable to the engineering department and a big battery of powerwrenches—he has done his job. Where little machining is involved and contact with the automation-conscious machine tool industry is lacking, the process engineer may have even less than a normal chance to build efficiency into manufacturing through automation.

Much work remains to be done to make automatic assembly 100 pct reliable. This will also make it expensive. Equipment must be as heavy and durable as modern machine tools. However, if assembly operations are removed from their present position—an afterthought in modern production planning—and equipment is designed for heavy duty automatic service, much can be accomplished in reducing cost and improving the quality of our industrial products.

Too often, it appears, final assembly is the *last* decision reached in formulating plans for manufacturing. The thinking is: We can always bring in enough wrenches to put the thing together. Automation, it must be realized, may very well lie in the opposite direction. If you plan to automate, try to eliminate as many fasteners as possible!

Often, assembly lines can be shortened considerably by giving consideration to automatic processing. For example: a new automatic machine designed to build and assemble a control device occupies 98 pct *less* floor space than was previously required. This fully automatic machine (1) cuts tubing to length, (2) assembles required parts, (3) manufactures required brazing solder, (4) assembles and checks the part, (5) packages the part. Savings in packaging cost alone is 6¢ per unit as compared with the previous method.

Another example of a highly automatic machine is an assembly machine for starters for automobiles. Several million units are required annually. The new assembly machine, occupying an area approximately 18 ft square, replaces three assembly lines, each 140 ft long.

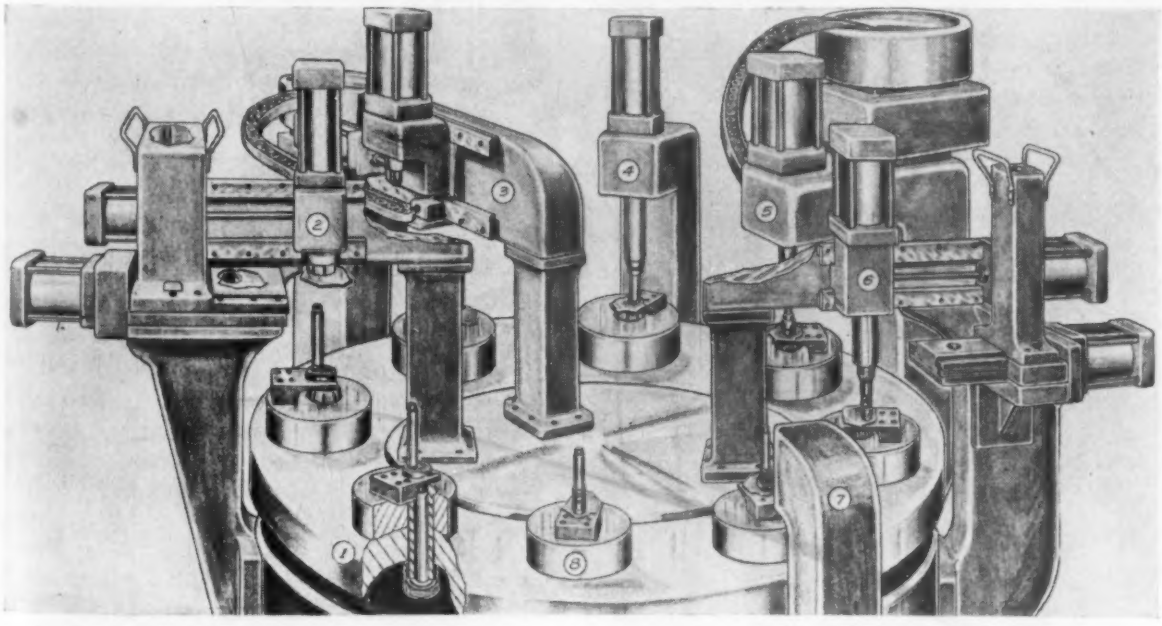
In addition to greatly reducing floor space requirements and increasing production, adoption of automatic processing may greatly reduce inventories. That pile of parts between machines can be eliminated as well as other inventories accumulating in conveyor lines, tote boxes and lift trucks.

A substantial improvement in quality

The ideal arrangement is to produce any parts that may not be hopper-fed directly at the automatic machine. Parts like springs can be made directly from wire. Seals can be made from strip. Other parts may be hopper-fed. In addition to reduced inventory, a substantial improvement in quality can result from controlling production at the machine instead of at final assembly.

Metal parts can often be hardened economically on special, fully automatic machines. This avoids unnecessary handling, cuts cycling time and reduces scrap loss.

Here is a sequence of operations that has been successfully combined in a single, dial-type, fully automatic machine: (1) cut off bar stock and insert in collet; (2) hollow mill two sides; (3) insert two bushings; (4) line bore



ONE MACHINE assembles counterweight, eccentric, bushing, collar. Stations: (1) Load, unload; (2) Press on counterweight; (3) Press eccentric on part way; (4) Press eccentric to bottom; (5) Assemble bushing; (6) Assemble thrust collar; (7) Inspect for end play; (8) Idle.

bushings; (5) broach keyway; (6) tap; (7) insert springs and ball bearings; (8) check completed assembly.

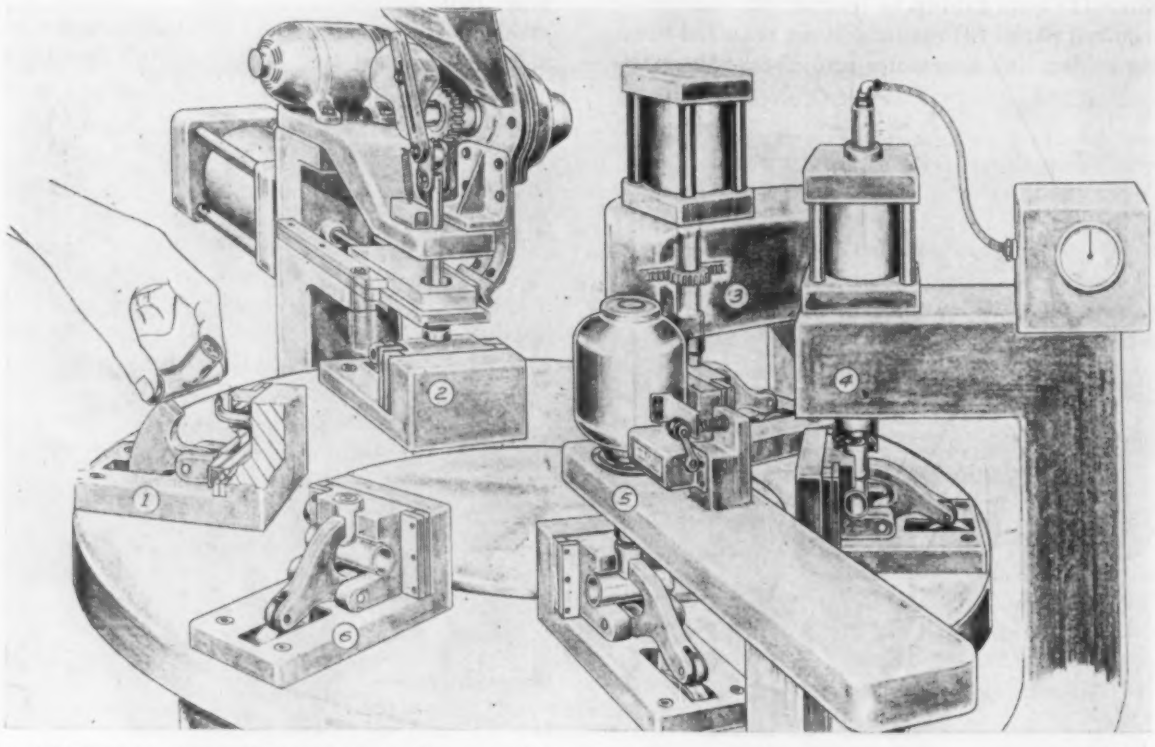
Machining, riveting, welding and heat treating are not the only operations that may be built into a fully automatic assembly line. Washing operations may also be included under some circumstances. For example, a ball bearing washing line has been reduced from 140 ft to a table 1 ft in diam. Here are the operations performed at stations that are only 2 in. apart. (1) insert race in indexing table; (2) wash; (3) wash; (4) pressure dry; (5) brush with statically charged brush; (6) unload.

A protective cap fits over the part at each station. The washing agent is directed at the part. Drainage is provided, of course. In addition to a substantial savings in floor space, efficiency of the operation has been greatly improved.

By planning the product and processing methods in advance, it is often possible to form metal, broach, grind and perform other operations without having the part leave the machine. Process engineers should always ask, "Is it really necessary to unchuck the part?"

As automation is carried further along by U. S. industry, more machines will be ordered to make a certain part from the raw material to the finished assembly. Drilling, broaching, milling and other operations will be included in one big special machine. The new machine tools incorporated in the special purpose machines will be designed to run at one speed rather than a variety of speeds, thereby simplifying somewhat their design and construction.

Many of today's familiar products may be strikingly changed to make room for automatic production. Recently, an automation engineer was called in to see what could be done that would make it possible to produce bicycles automatically. The new design will bear slight resemblance to the present bicycle. None of the parts will fit the present product. There are no stampings. No drilling is required. A number of subassemblies will be built on fully automatic machines. Production savings on the new bike have been estimated at more than 50 pct. Not even the present spokes will be used, since these could not be assembled automatically. There are no nuts and bolts; all having been eliminated. Parts are designed to fit snugly together. The new bike can be disassembled in seconds and put in the back of your car. Similarly, it can be shipped in a small box.



ASSEMBLY AND TESTING are combined in this machine which assembles valve and rivet. Stations: (1) Load and unload; (2) Assemble valve and rivet; (3) Position valve and set rivet; (4) Pressure test; (5) Torque test; (6) Eject. Note use of inspection stations to keep quality high.

Natural Combination—

INDUCTION HEATING Meets Basic Automation Needs

◆ Short time cycles, accurate control and good reproducibility make induction heating well suited to automation . . . With appropriate handling equipment, many induction heating operations have been made fully automatic.

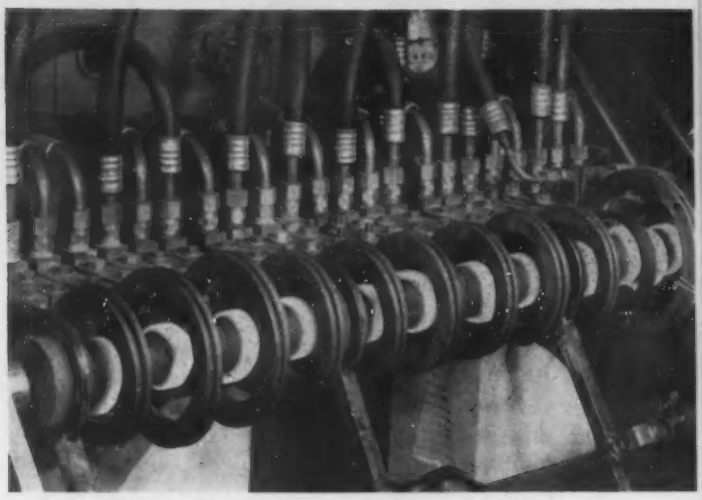
◆ Automobile axles are hardened six at a time to rigid specifications, and annealed for subsequent machining of keyways in the same cycle.

◆ Selective hardening of camshafts, forging of ferrous and nonferrous parts, brazing of carbide tips, and sizing of axle housings are only a few applications where induction heating and automatic handling have been teamed for high production.

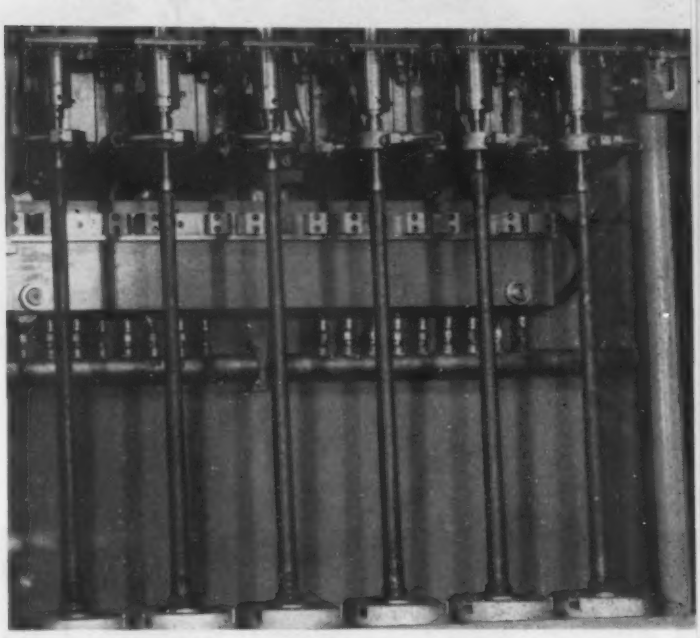
By W. K. Ginman,
Michigan District Manager,
Tocco Div., Ohio Crankshaft Co., Cleveland

◆ INDUCTION HEATING lends itself exceptionally well to automation for a number of good reasons. In any operation where automation is to be considered, a brief time cycle, accurate control and excellent reproducibility are primary requirements. Induction heating meets these requirements easily.

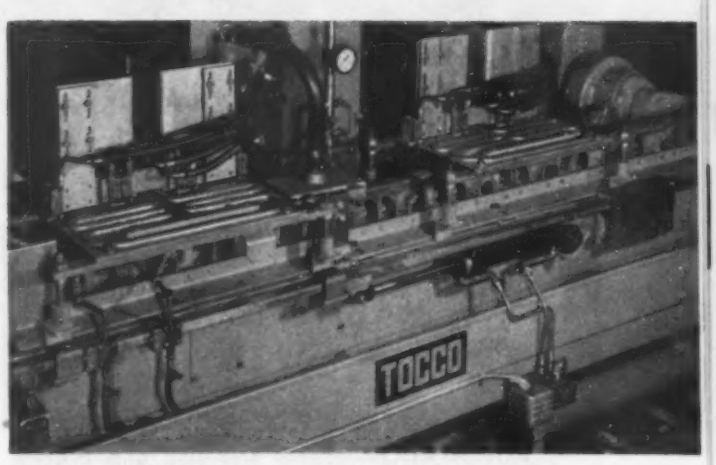
Compared with most heating methods, induction heating often reduces the time cycle from hours to a fraction of a minute. The area to be heated can be controlled accurately. Since heat output is regulated by both power input and



CAMSHAFT hardening is a completely automatic selective operation. Only the cam surfaces of the cast iron shafts are hardened.



SIX AXLES are hardened simultaneously to rigid specifications. Areas requiring machining may be annealed during the same cycle.

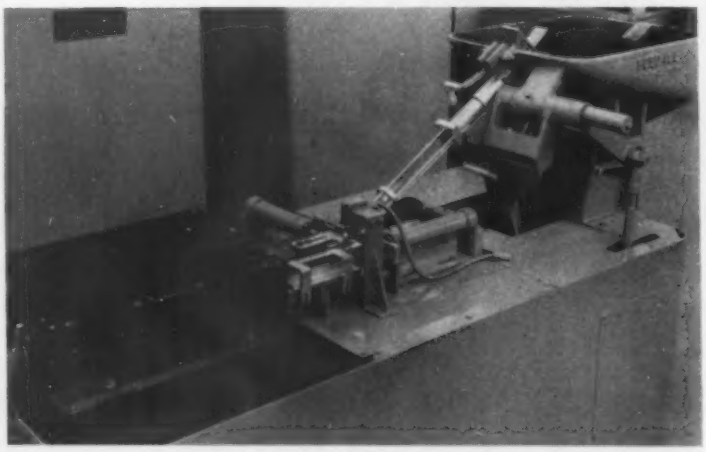


HIGH-PRODUCTION machine hardens and draws surfaces of tractor track links.

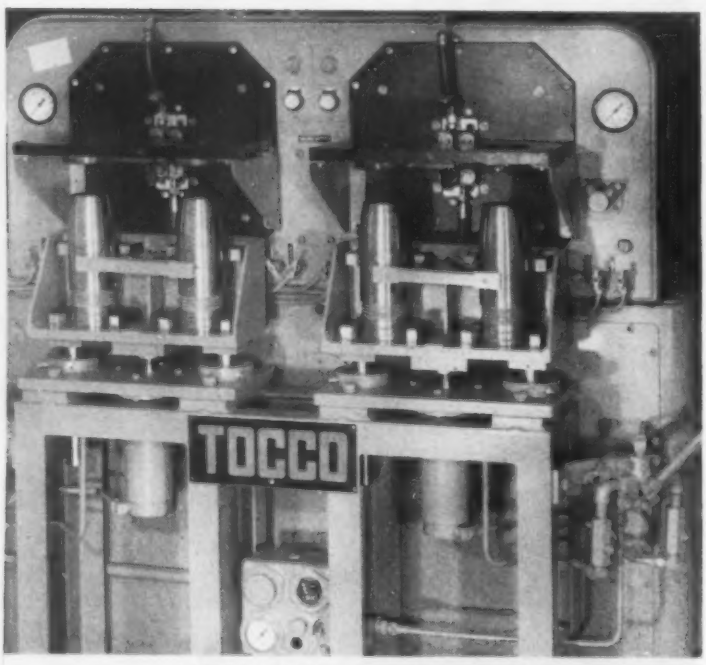
Areas requiring subsequent machining may be annealed during the induction hardening cycle . . .

time, treated parts are consistently uniform.

Tooling for automatic handling poses two other requirements: delivering the part in the right position at the right time, and designing a fixture to apply heat for the required time. Among the delivery methods are automatic conveyors with ingenious pickups, magazine feeds and indexing tables. Ability to split the inductor, and bring the halves together again automatically, has simplified this tool design problem.



STEEL, aluminum and brass slugs are induction heated at rates up to 7200 per hour. Feeder supplies parts to coil automatically.



AUTOMATION speeds soldering and brazing operations. Here, an induction heating unit brazes nose adapters to chemical shells.

The great deal of experience gained in precision hardening, annealing and heating for forging, brazing and soldering has helped to solve many problems in applying heat to a part either automatically or manually. Parts may be regular or irregular in shape, and liquid quenching may or may not be used. Rigid specifications for the hardness pattern and range are easily met.

Axle production speeded

Originally, it was the need for high-speed heat treatment of parts which brought induction heating into being. It has been closely identified with automatic processing ever since.

Recently, several major automotive producers adopted induction hardening for axle shafts. Except for loading and unloading, the operation is entirely automatic. Carbon steel axles are hardened six at a time to rigid specifications as to maximum hardness and hardness penetration.

Axles are located manually in V-type fixtures. Heat is applied automatically as the hardening equipment scans the shaft over its entire length. The axles rotate slowly during hardening and quenching. In this operation, surface hardness is held between 35 and 40 Rc. Areas requiring machining, such as keyways, may be annealed during the same cycle.

For best use of electrical equipment, two hardening machines operate from the same power source. While one machine is in operation, the operator unloads and loads the idle machine. To start the automatic cycle, the operator merely presses a button.

Equipment must be rugged

Use of induction heating for this purpose has improved product quality. Service tests show that axle life has been extended by the closer surface hardening pattern that can be held by induction hardening. In addition, production in a given floor area is considerably greater, and requires less manual effort. Another saving results from the use of plain carbon steel which has replaced more expensive low-alloy steel.

Induction hardening equipment, as well as the accessory materials handling equipment, must be rugged for such applications to assure continuous operation and long life. In designing the equipment, special attention must be given to such factors as rigidity, corrosion resistance and wear resistance. On these machines, corner posts are themselves induction hardened and chrome plated to resist wear and corrosion.

Automobile camshafts are among other high-production induction-hardened parts. Howeve

the automation and hardening problems are quite different from those encountered with axles. Instead of steel, the camshafts are made of cast iron. The hardened surface of a shaft consists of a series of hardened areas, varying in number from 7 to 13, depending on the engine design and the number of cylinders.

The camshafts are magazine-loaded into the machine and fed by gravity. Each shaft is picked up on centers, after which it is indexed into proper heating position. Heating is by induction as the part rotates slowly. It is then indexed back to its loading position, dropped into an oil bath, and loaded automatically onto a conveyor.

This installation exemplifies a completely automatic selective hardening operation. In this case, where the volume of parts and amount of handling is substantial, the expense of fully automatic equipment is well justified.

Another example of completely automatic handling and hardening is in the volume production of trunnion caps for universal joints. In this operation, heat treating is combined with machining. Unnecessary handling during heat treating has been completely eliminated, and the entire processing cycle takes only 17 seconds.

Automatic screw machine used

For this application, a heating coil had been installed in place of a machining station on an automatic screw machine. After all machining is completed, the part is induction heated while it remains in the machine. The part is then quenched with machine oil and cut off. Since eight such pieces are used in each car, production must be maintained at a high level. Except for the heating coil, no special tooling is required other than that normally used on an eight-station screw machine.

Induction heating in an automatic screw machine is also used in producing pump shafts. Again, manual handling has been eliminated and floor space requirements are much smaller. In this case, instead of using the usual heating units having frequencies of 450,000 cycles, a 10,000-cycle machine is used because a very shallow hardening depth is not necessary.

Rapid induction heating for forging and hot forming offers another opportunity for high production rates and improved quality control through the use of fully or partially automatic equipment. Bar stock up to 4-in. in diam, for example, may be heated to the desired length and fed automatically into the forging machine. Using such a setup, as many as 1200 parts per hour can be produced.

More and more types of parts are now being fed into forging machines, either by conveyor or hopper, for single or multiple-blow forgings. Blanks move automatically through the heating coil. Temperature of the blanks is also checked automatically as they move through the cycle.

Automatic forging of induction heated parts is not confined to ferrous metals. Brass slugs about ½ in. long and ½ in. diam are fed by hopper and are forged at the rate of 7200 per hour. After forming, the fittings are drilled and tapped.

Another application where automatic handling is used in conjunction with induction heating is in brazing and soldering operations. High-frequency induction heating of cutting tools for brazing carbide tips into place is well established. Even these setups are being made more automatic.

Costs cut in soldering

Automation has invaded the soldering field where induction heating has been highly successful. A typical example is a J-bend of a plumbing trap which had previously been manually assembled and soldered. Now, the part is induction heated and solder is fed automatically from a spool. A rack and pinion device feeds a uniform amount of solder every 6 seconds. As a result, no manual handling is required, cleaning costs have been reduced and product quality has been improved.

Metallurgically, automatic materials handling and induction heating offer important advantages. The principal benefits are: reduced heat treating time, optimum control, lower cost, optimum surface hardness, and maximum product serviceability particularly where steel is used for torsional members.

The combination of automatic materials handling and induction heating is used in other interesting applications. High-frequency induction heating, for example, is used to cure lacquer on door knobs. Another use is in forge welding of steel strips which are heated to 2500°F, then pressure welded at rates of more than 200 ft per minute. Since the metal is not melted, no spatter occurs.

Another highly successful application is that of shrink fitting ring gears to automobile flywheels. This process is also used for fitting pins into connecting rods, and assembling pump gears to shafts. This latter application eliminates the need for keyways.

Housings stretched to length

Where assemblies are brazed or soldered, induction heating can also be used to good advantage for debrazing and desoldering. This type of service work can be automated easily where volume will justify the investment.

An unusual application of induction heating is spot heating of rear axle housings. By making the housing undersize, facing, heating two small spots and stretching in a hydraulic press, output has been increased and cost lowered. Except for loading and unloading, this machine is fully automatic.

A standardized line—

Automation Within Reach of Many Foundries

By W. E. Dougherty, Foundry Engineer, Giffels & Vallet, Inc., Detroit

◆ In the period of keener competition ahead foundries are faced with the tough problem of how to remain competitive . . . Automation may hold the answer . . . Most foundries are already using some form of automatic operation and the step to automation should be easy . . . Automation removes the need for or replaces a man's sensory as well as his muscular apparatus . . . But it goes beyond that . . . Starting with design it must be applied to both product and processes.

◆ For the foundryman a main prerequisite for automation is standardization of handling surfaces on parts in progress . . . Jobbing shops especially need a method for adapting the varied patterns supplied by casting buyers so they can be quickly handled on a standardized line . . . Also, a definite plan of control, especially as applied to sand, is a must in any foundry automation program.

◆ INDUSTRY has taken the word *automation* to its heart. It's a good, round, decisive word that can be mumbled or shouted without serious fear of reprisal because its precise meaning seems to be up for debate. Different people seems to see automation and describe it according to their own lights. Truth of the matter is, automation has been around a long, long time. We just didn't know what to call it. Automation can and has been saving industry countless manhours spent on dirty, dangerous and largely thankless jobs.

Perhaps the easiest understood definition of automation is given by comparison.

Mechanization removed the need for man's muscular power.

Automation, comparable to mechanization, goes a step further. It removes the need for or replaces a man's sensory as well as his muscular apparatus.

The thinking involved in automation (and automation is a *manner of thinking*) extends beyond the mere machinery involved. It affects all production from conception of the product at the engineer's drawing board to warehousing of the finished item.

Often the process of replacing a man's sensory apparatus with a machine on a given operation becomes so complicated and expensive that it is well nigh prohibitive. Many of these difficulties can be cleared up by designing *products and processes* with the idea that the operations will be performed by mechanical rather than human manipulation.

Contrary to popular belief, automation need not be a complicated series of machines. As far as the foundry industry is concerned, simplicity of design should be the keynote.

Some proponents of automation are concerned with pipe-organ size batteries of electronic equipment involving computers, recorders, tape film, etc. These people seem to be going out of their way to scare the bentonite out of the foundryman.

The foundryman is not interested in playing a high production tune on a pipe organ. Nor is he generally interested in producing an astronomical amount of molds per hour. But he does want to produce sound, true castings economically.

While automation lends itself beautifully to mass production shops, its main aim is to increase production per man, and not necessarily to increase production only.

Standardize Handling Surfaces

The main prerequisite of automation is *standardization of handling surfaces* on parts in progress. This requirement seems to have been tailor-made for the foundry industry. While it is true that the scope of work in the average foundry varies from minute to gigantic, it is also true that, for the most part the foundry is not concerned with the dimensions, contour, mass or bulk of the castings themselves.

The foundry is, in the majority of cases, concerned only with handling containers. These containers may be ladles, flasks, core boxes, driers, core setting fixtures, etc. But *they are all containers,* and as such need bear only one dimensional relation to the materials contained therein. They need only have handling surfaces which extend beyond the parts they contain.

High production foundries face few problems from the standardization angle. Many jobs are run continuously, and in such quantities that automation may be designed for that particular operation, and need never be employed for any other type of production. In spite of these built-in advantages many large shops have not explored the possibilities of automation to any great extent.

Since the bulk of the foundry industry is concentrated in medium-sized shops, both jobbing and captive, it is these shops for which a foundry automation program should be developed.

All sizes and shapes

Unfortunately, the jobbing shops are at the mercy of the purchasers of castings in that they must use the purchasers' pattern equipment in the majority of cases. These patterns come in all sizes and shapes and are generally used pretty much "as is."

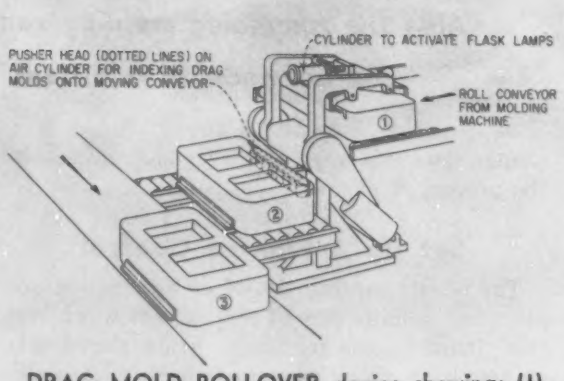
The sketches of pattern equipment shown on pp. 226 and 227 are presented not so much as a finalized, proven method of pattern adaptation, but as an idea only.

The filler (used in adapting nonuniform patterns to a standard adapter plate) with which the patterns are to be surrounded could possibly be composed of any of several different materials—plastic, a resin-rich shell material, very fine core sand, possibly Woods metal or some like compound that could be melted out at a low temperature and recovered.

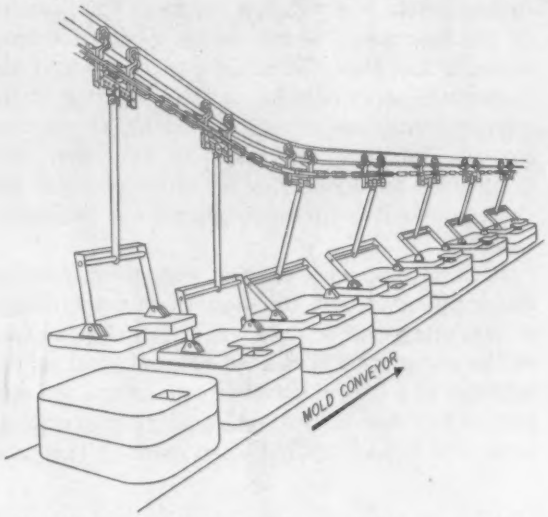
Some similar procedure for adapting all the bob-tailed patterns received by jobbing foundries to a predetermined flask and pattern size would pay enormous dividends on a production per man basis. This method will have the net result of allowing jobbing foundries to operate on a basis similar to that enjoyed by, say, the automotive companies.

The use of a master adapter pattern plate will reap a second dividend in the form of reduced downtime for pattern change-over. If all patterns to be run on a given machine are to be the same size, it will be a simple matter to effect a pattern

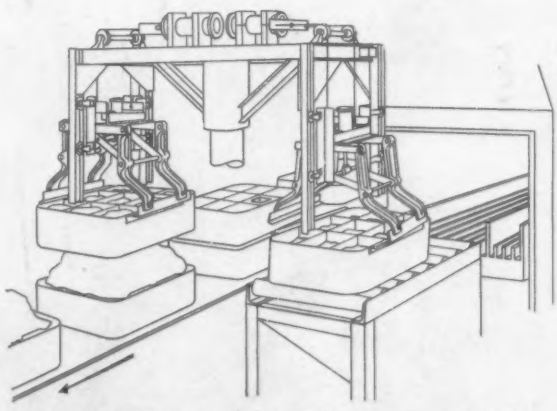
IN SUCCESSFUL USE TODAY


CYLINDER TO ACTIVATE FLASK LAMPS
PUSHER HEAD (DOTTED LINES) ON AIR CYLINDER FOR INDEXING DRAG MOLDS ONTO MOVING CONVEYOR
ROLL CONVEYOR FROM MOLDING MACHINE
①
②
③

DRAG MOLD ROLLOVER device showing: (1) drag in position to be rolled over; (2) drag ready to be indexed onto conveyor; (3) drag moving away from index station on conveyor.



WEIGHT HANDLING conveyor lowers weights onto molds prior to pouring station. Depending on size of molds and conveyor speed this operation will save from two to four men.



AUTOMATIC DEVICE for opening, closing molds, handling copes to shakeout indexes 180° per flask. Cradle at right has just released flask on inclined rollers feeding shakeout.

Return Sand: The Industry needs some positive means of measuring the remaining molding sand ingredients quickly so that adjustments can be made to additions . . . Improved casting quality will result.

change, and will very nearly render obsolescent the process of changing flasks.

Set Up A Plan of Control

The second prerequisite of an automation program is a definite plan of control. The word "control" implies some regulation being placed upon an operation either prior to or during the action of the process. While there are plenty of ingredients and operations in a foundry that require control, a large measure of the problems inherent in foundry operation can be cleared up by proper sand control.

A well-equipped sand laboratory is practically indispensable in a well-run foundry. The function of the laboratory should be to evolve a correct formula and then run checks to find out if the formula is being adhered to. The function of the man running the mixers should be to see that correct additions are made to the sand. But neither lab technician nor the mixer operator has the equipment required to control the sand mixtures.

Both have an idea of what they want, and the mixer attendant will add a can of this, two scoops of that and a pail or so of water. But this is based on the assumption that molding sand entering the mixer is of a known value. No one knows the proportions of the return sand; all they can do is hope that it is composed of so much of this, and so much of that. The industry needs some positive means of measuring the remaining molding sand ingredients quickly so that adjustments can be made to the additons.

Use of control equipment on molding sand will result in a standardization of quality of castings and will reduce by a large percentage the number

AUTOMATION AND THE FOUNDRY

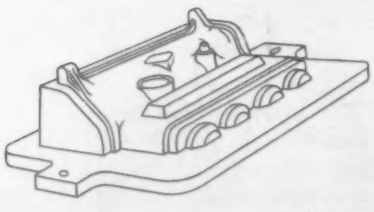
Recognized . . . Far-sighted and inventive men recognized a necessity generations ago . . . The first automatic manufacturing plant, a flour mill, operated about the time of the American Revolution.

The Past 25 Years . . . Slow acceptance of automation by foundries is partly tied to the times . . . Thirties: Little money but labor was cheap . . . Forties and Fifties: War boom and too little time and incentive.

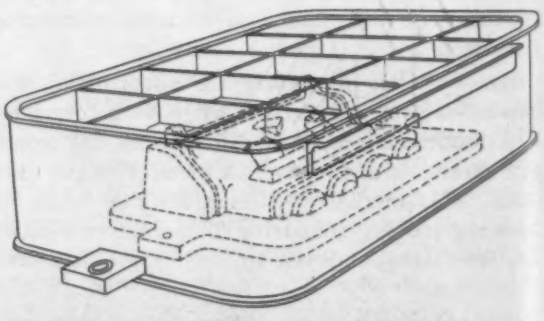
A Probability . . . There are probably enough different types of equipment operating in different foundries today to provide a completely automatic system if put together on one job.

Today and Tomorrow . . . Economic indicators point to a leveling off period . . . There will be plenty of intense competition . . . But skilled foundry labor is increasingly hard to find and will continue to be a big factor in costs . . . Automation and automatic operation can help answer tomorrow's economic problems.

ONE WAY TO ADAPT PATTERNS TO STANDARD FLASK



CUSTOMER'S DRAG pattern probably won't fit your equipment but can be adapted. This requires an adapter plate and use of a filler material such as resin, Woods metal, etc.



STANDARD FLASK superimposed on customer's drag pattern may hold more sand than needed. But cost of extra sand is negligible compared to savings from a standardized automatic system.

of manhours expended in cleaning. The incidence of errant scabs, buckles, blows, rat-tails, ram-offs, etc. will drop sharply under a definite control program.

A molding system control program will be rounded out with pneumatic controls on the molding machines, if they are of the jolt-squeeze type. These controls will insure repetitive operations of the machine and will point out probable trouble spots if there is a departure from the norm.

The accent on automation and its acceptance in industry will throw a glaring light on the need for adequate compressed air facilities. All the sand control in the world will be of questionable value if there is a varying air pressure being delivered to the machines. Industry in general, and foundries in particular are woefully short on their compressor and/or line capacity.

There's Profit in Fringe Benefits

Installation of an automated system will carry with it fringe benefits not immediately apparent. Chief among these is the change in maintenance practices from those under which most foundries labor at the present time. To maintain means to *keep in operation*—and the interlocks necessary on a fully automatic system will require that a maintenance department lives up to its definition.

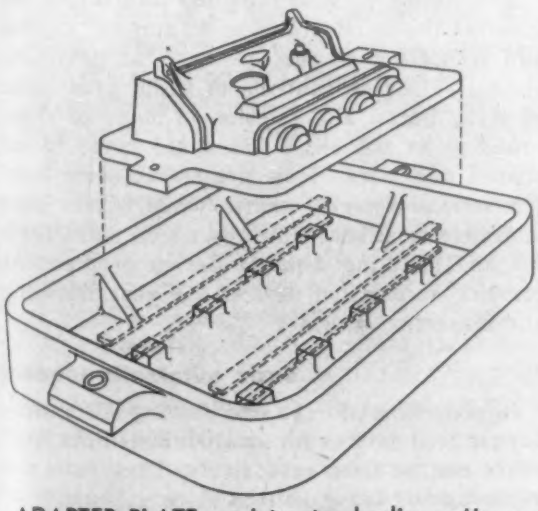
This will require extensive routing check sheets, and will be aided immeasurably by the installation of recording instruments which will indicate variations in stroke of cylinders, amperage of drives, air pressures and so on. Any such variations will point a finger at a probable source of trouble, and will permit the maintenance crew to be ready to make the necessary adjustments during the next shift change, lunch hour, off shift or week-end depending on the scope of the job.

Design of the automatic handling devices themselves presents no great problem after standardization and control measures have been adapted. It is the planning for automation and the preliminary steps which will present the problems, and which will also, if properly planned, insure a smoothly operating automatic system.

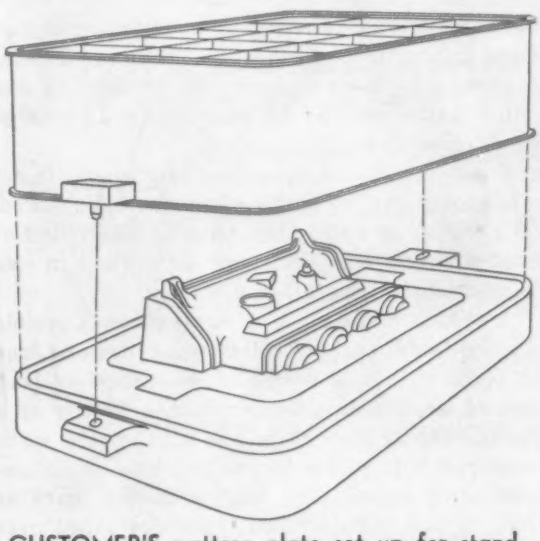
SUMMING UP

Foundries Should Be Easy to Automate

1. Automation is not so much a type of equipment or method of operation, as it is a manner of thinking.
2. Automation covers the entire field of manufacturing, from design to finished product.
3. The design of automatic equipment, its simplicity and resultant cost are dependent upon standardization and design of parts being handled.
4. The effectiveness of automation is largely dependent upon the control measures adapted along with it.
5. There's nothing new or different about automatic devices lumped under the heading automation. Most foundries are now using some type of automation.
6. Foundries to remain competitive with other branches of industry, must make further use of the automatic type operation.



ADAPTER PLATE used to standardize patterns. Pattern must be set on stools (dotted lines) and shimmed to bring parting face into same plane as parting face of adapter.



CUSTOMER'S pattern plate set up for standardized line. After pattern has been shimmed, secured to plate, filled is poured into cavity and cured. Facing operation may be needed.

Where it stands, where it's going—

AUTOMATION in Gear Finishing and Inspection

◆ Automation in gear production is now in an advanced state of development . . . Future techniques are being finalized and definite trends can be predicted . . . Although first developed for automotive transmission gearing, makers of gears in smaller quantities can also economically use automation devices.

◆ Further automation of gear production will probably evolve around the adaption of present standard equipment to automation concepts . . . Only specialized, high precision machine tools of the type developed over the years can meet gear tolerance requirements . . . Full automation represents a large capital expense . . . Most improvement will come in inspection and control devices.

By **B. F. Bregi,** Vice-President
National Broach & Machine Co.
Detroit

◆ GEAR PRODUCTION automation now and in the future will probably evolve around the adaptation of standardized gear production equipment to automation concepts. There are several reasons why the standard gear production machine tools will be in tomorrow's automated production lines.

First, one should remember that a gear is not made up of one flat surface that has to be milled, or a series of holes that have to be drilled or even a single hole that must be ground in size in relationship to a given diameter.

A gear is made up of a number of accurately formed teeth, each of which must often be true to form within a 0.0002-in. tolerance or less, spaced around a diameter within tenths of a thousandth relationships and all the gear teeth must run true within tenths to a hole or a diameter. Only specialized, high-precision machine tools of the standardized types developed over the years can now produce parts to such tolerance requirements.

Secondly, full automation is a costly capital outlay for even the largest metalworking plants. Use of standardized gear finishing machines and inspection equipment enables the user to get more for his money. Design time and extensive tryout periods are completely avoided.

Third, is the question of maintenance. When a machine tool builder offers his equipment in standard models, the "bugs" are worked out of it, and maintenance costs are low. Also, off-the-shelf delivery of machine parts for standard models can be of great help in keeping a production line in operation.

Fourth, and among the most important reasons, is downtime. When standardized gear finishing machines and inspection equipment are used in high production, usually more than one machine is required. If one machine requires maintenance or a cutter change, the remaining machines in the line can be economically supplied to permit such downtime without affecting overall production requirements.

A fifth factor in favor of using standard gear production equipment is the ease with which machines of this type can be adapted for automatic control. Individual machines of current design can be readily controlled by new inspection devices.

Automation in gear finishing and inspection involves the usual problems of moving, storing and inspection of parts as well as providing suitable machine controls to avoid production of scrap parts. The solution to many of these problems is not easy. Gears are made in all shapes and sizes. Some are small, some have symmetrical integral shafts while others have unsymmetrical shaft designs which make feeding and handling a major design problem. At present, automation devices for gear finishing and inspection include:

Basic automatic loaders

Intermachine storage and feeding—Vibrating hopper feed devices for small and medium sized gears can be used extensively. They have the advantage of being able to store a quantity of parts and feed them in proper orientation as desired to the gear finishing or inspection equipment.

Small belt conveyors can also be successfully

used to feed parts to main gear conveyor lines following inspection and rotary gear finishing operations. Where gears of medium sizes and larger are handled, magazines and conveyors can be successfully applied.

Automatic loading—Over the past few years three standardized basic types of automatic loaders have been developed to handle most types of gears considered for gear shaving production line automation. These are: (1) Rocker-type loaders for small gears up to approximately 2 in. diam. (2) Slide-type loaders for medium sized gears and shafts or parts requiring a steady rest. (3) Straight line loaders, for larger gears and cluster gears, where transfer directly from one machine to another is desired. Each of these loader-types include a simple size gage which prevents oversized parts from entering the feed chute.

Automatic inspection—Among recent developments in this field are specialized motor-driven units which gage and reject parts both before and after gear finishing. Tied in with the gear shaving machine controls, they will stop the machining if too many rejects parts are produced. Specialized motor-driven units can also control machine settings and feed the work automatically into the cutter if undersized parts are produced.

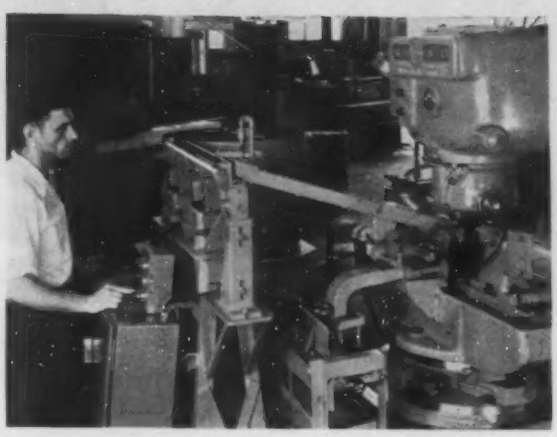
Automate gear speeders

Gear speeders have also been automated to provide either fully automated or automatic cycle types as a further means of automatic inspection.

Complete automation of gear production lines could not be accomplished were not some means of automatic inspection provided. A piece of inspection equipment in an automated line must not only gage parts and pass on only those of correct accuracy to the next operation, but it must also prevent the production of too many rejects. It should also tell the maintenance man why the machine was shut down and, if possible, sort the reject parts. On some operations it is advisable that the inspection device even control the machine settings.

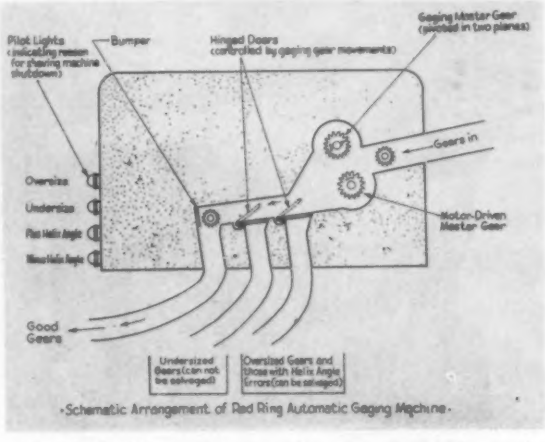
For between operation checking, all automatic motorized gear inspection devices being supplied today make use of master gears. One of these gears is motor driven. The other is displaced in one or more planes to provide both size and helix angle checks. Special features are often included to check particular types of reject properties peculiar to the type of gear production equipment (like a hobbing machine or gear shaper).

Displacement of the master gear actuates electrical controls in the inspection devices to direct gears in various paths through the gear sorter, thus separating the good from the bad gears. Integrating controls enable the devices to shut off the machine or change the machine



VIBRATING hopper feed, magazine loader infeed, rocker-type automatic loader and small belt conveyor are automation devices used on this rotary gear shaving machine to handle parts.

SLIDE-TYPE loader for handling unsymmetrical, integral long-shaft gears on standard shaver.


Pilot Lights (indicating reason for shaving machine shutdown)
Bumper
Hinged Doors controlled by gaging gear movements
Gaging Master Gear (guided in two planes)
Gears in
Oversize
Undersize
Motor-Driven Master Gear
Good Gears
Undersized Gears (can not be salvaged)
Oversized Gears and Those with Helix Angle Errors (can be salvaged)
Schematic Arrangement of Red Ring Automatic Gaging Machine

AUTOMATIC gaging and sorting is performed by motorized unit shown in the sketch above.

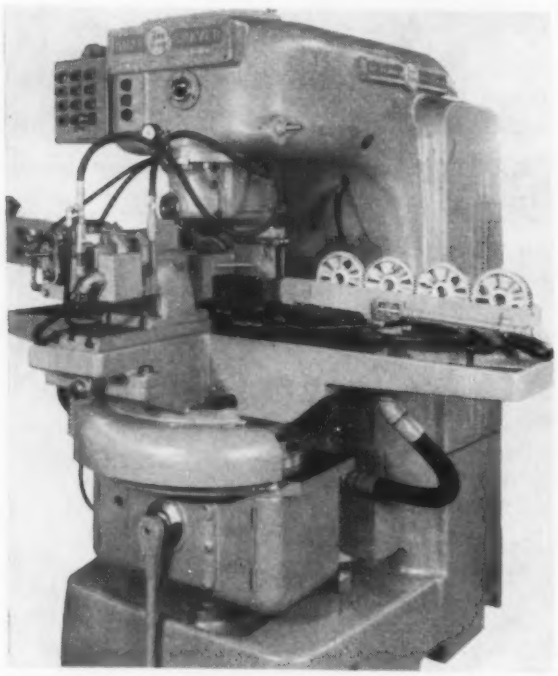
settings as required under various conditions.

The final inspection check on the suitability of high production gearing has always been to run the gears on a speeder in mesh with a master gear, listen to the sound and note the contact. Although it is not yet feasible to make this check without resorting to human judgment, speeders can now be installed which will perform all handling and speeding functions except the rejection of the gear.

Following this rejection, in which the inspector diverts the gear into a work area, burrs can be removed or the gear further analyzed by specialized gear checking equipment to determine the reason for rejection.

The only reason that a manufacturer of gears in small lots should install automation devices is to cut costs through increased production. Fully automated gear production equipment is expensive and can only be economically justified by mass producers of gears. There is no evidence to date that full gear production automation will assure any more than what is considered today to be acceptable precision. It may well, however, provide more consistent high precision.

There are, however, some specialized devices that the small lot gear manufacturer should consider. They provide minimum downtime for changeover and maintain consistently high shaving machine and speeder output. If the small producer does have a high production job, however, he should not overlook partial or full automation.



STRAIGHT line loaders of this type are ideally adapted to the handling of larger gears.

The semiautomatic loader is one cost saver for the smaller production shop. With a semiautomatic loader on a rotary gear shaving machine, the operator only has to load the gear in mesh with the cutter, push a button and remove the gear after the teeth have been shaved. His hands are kept from the cutting area during the shaving. Work-holding fixtures, machine stops and a workrest are all that have to be changed to shave another gear.

Further refinements in shaving

In the inspection field, the automatic cycle speeder is economically feasible for small-lot production of small and medium-sized gears. Again only work-holding devices and machine settings have to be changed to inspect a different gear.

It appears that rotary gear shaving methods will be used to finish precision gear teeth for some time to come.

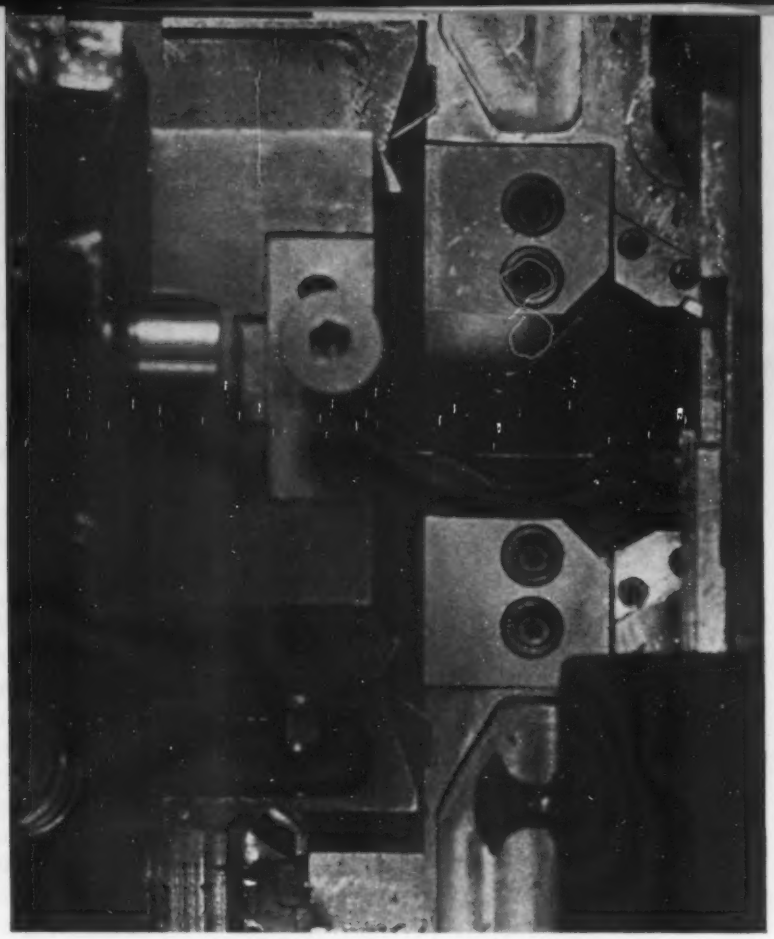
Further improvement will be in the methods of loading and unloading parts from shaving machines. Undoubtedly there will be some further refinements in the shaving process but these will be made on the standardized line of equipment. As more and more automatic loaders are installed there may be some design simplification and a possibility of lower cost.

Most of the improvements in behalf of the automated plant concept will be made in the inspection and control devices which, in the final analysis, determine the success of the automatic production line.

These inspection devices will become more specialized to meet the requirements of particular gear production operations. It is possible that individual devices for gear shapers will be made in prototype models differing from those used to check hobbing machines or rotary gear finishers.

They will be even more functional in determining why the machine was shut down and what to do to correct it. It is not inconceivable that automatic tool changes may be made on automation lines of the future as dictated by automatic gear gaging machine measurement.

It is also possible that gear production operations such as hobbing will be controlled by automatic gages of the future which will actually tell when to shift the hob and control the shifting means. On gear shaving operations, it may be advisable to have the gage control the work infeed mechanism and thus assure consistant production of parts as far as tooth size is concerned.



NAIL emerges from die after heading in fully automatic Nail-maker, is about to be cut off while its point is being forged.

Parts get complex, accurate—

Automatic Equipment Leads Trends in Improving Forged Products

By R. G. Friedman, Vice-President and Asst. General Manager, The National Machinery Co., Tiffin, Ohio

◆ New trends in forging have left the village blacksmith far behind . . . Modern machines now produce nails at rate of 20 per second . . . Progressive cold headers have outputs 7 to 15 times greater than previous machining methods . . . Faucet stems are made automatically at rate of 70 per minute.

◆ Besides being made faster, forgings—hot and cold, ferrous and nonferrous, small and large—are stronger, more complex, more accurate, have better finishes . . . Up to 900 crankshafts are forged in an 8-hour shift, saving a pound of material on each . . . In fewer forging steps, 11 oz are saved in the weight of a brake pedal.

◆ MODERN FORGING, hot and cold, ferrous and nonferrous, is anything but a static science. Production speeds are getting faster. Some forgings are getting larger and more complex in shape. Others are getting smaller, stronger, and are made faster to closer tolerances. Odd-shaped parts are now made more advantageously by forging than by screw machining.

Actually, automation is the big story behind the progress made in the forging industry. For many years, producers of forging equipment have been developing many new types of automatic and semiautomatic forming equipment. Making metal flow into a required shape has been a challenging job.

Increased production of forged shapes has

been a primary requirement, particularly in the postwar era. Improved die designs and better die steels were a "must." Some users of forging equipment want to combine several forgings into one operation, thereby introducing problems of both size and complexity. Other users want small, accurate, high-strength parts in quantities that sometimes approach astronomical figures. In each case, greater output of an improved product at lower cost and with reduced scrap loss is essential.

Development of new automatic multistation machines has made it possible to forge parts previously made by other methods. This is particularly true of small machined parts. In other cases, modern forging equipment has increased production rates by wide margins, reduced scrap losses, and improved products through better physical properties or greater accuracy in size and shape.

Nailmakers run continuously

Fully automatic, modern Nailmakers, utilizing carbide tooling, magnetic conveyor belts and a safety shutoff system are fed wire automatically from large coils. Patterned after a modern cold header, these machines run for an entire shift without stopping. Recent models are capable of producing 8d nails at a rate of 11 per second, 5d nails at 14 per second and 2d nails at 20 per second. More than 30 million 5d nails were produced recently during a 600-hour run without changing tools.

Multistation progressive headers are now producing parts to close tolerance at rates up to 15 times faster than by previous machining methods. Material waste has been reduced up to 50 pct by using the new method of production.

The latest machines are especially well suited for double or triple extrusions, or multiple heading operations, where two or more die impressions are necessary. A finished forging is produced with each stroke. These machines are made in many sizes and have as many as five stations. Their output ranges from 50 to 110 pieces per minute depending on the size of the job.

Faucet stems plate better

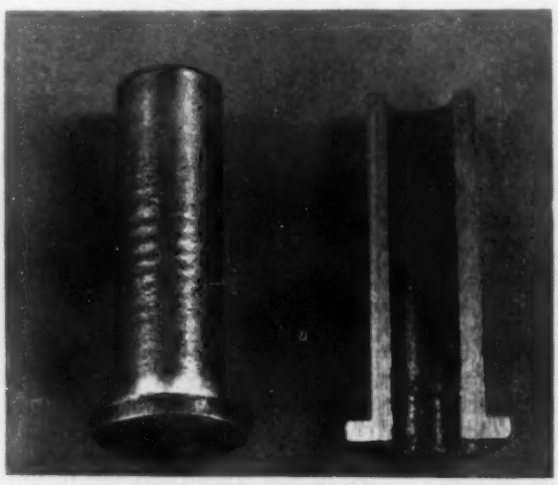
Another part produced automatically is a faucet stem. It is made at the rate of 70 per minute in a three-die progressive header. Starting wire size is 0.490 in. This is extruded down to 0.437 in. Extrusion, in addition to strengthening the shank, closes the seams in the brass stock and thereby facilitates plating. Previously, this part was machined from bar stock.

Hollow rivets are produced on modern progressive machines at rates of 90 per minute. The rivets are made by extrusion on a 5/16-in. automatic progressive cold header. The operations include cutoff, squaring, extruding, heading and punchout. The extruded hole is 1 in. long and 3/16 in. in diam.

Nut forming machines are excellent examples of modern, automatic equipment used in processing metals. The cold nut former automatically produces nuts from coiled wire or rod at rates up to 100 per minute. Rates of 40 pieces per minute are attained in production of 1-in. (USS) and 1⅛-in. (SAE) nuts. Finish, soundness and accuracy are excellent. Since the nut is cold-forged, the only waste is a small slug from the hole.

Hot precision forging has also made rapid strides in recent years. A radically new machine is capable of producing 1-in. nuts at a rate of 85 per minute and 1½-in. nuts at 75 per minute. In the past, the industry has had to

TWO ROLLING PASSES to elongate initial bar followed by finish forming on same heat forms brake pedal. Method saves 11 oz per forging.



HOLLOW RIVETS, extruded by an automatic cold header at rate of 90 per minute, are cut off, squared, extruded, headed and punched out.

absorb a scrap loss of 50 pct on large hot-forged hex nuts and 30 pct on square nuts. In these sizes, scrap loss is now 8 to 10 pct.

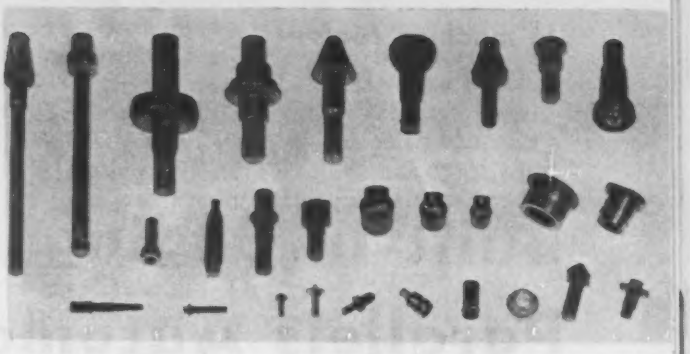
Industry's quest for closer tolerance forgings and lower machining costs is endless. Introduction of the Maxipres in the early 1930's offered a solution to this problem. World War II demonstrated press forging equipment reliability.

Reports from Maxipres users of four times greater output are not unusual as compared with their previous forging installations. Equally important is that much of the drop forging "art" has been removed. Most forgings can be made in only two or three blows in equipment of this type. Mechanical ejection is possible, an important step toward automation. Material cost and machining time are also substantially reduced. Since squeeze on the die followed by quick ejection replaces a hammer blow, die life has been improved.

A number of military ordnance forgings are made economically by extrusion on a Maxipres. A 2.75-in. rocket head is hot-forged from round-cornered square stock. After a centering and scale-breaking blow, the blank is hot-extruded to produce the finished forging. This forging is made on a 1600-ton Maxipres from 2¼-in. material 4⅞ in. long. The production rate is about 300 pieces per hour.

Each forging saves 1 lb steel

In one of the largest and newest automotive forge shops, a relatively inexpensive Reduceroll has replaced a hammer to facilitate the production of automobile steering bellcrank forgings. In addition to reducing manhour requirements, output has been increased from 575 to 900 forgings per 8-hour day and a pound of steel is saved for each steering bellcrank forging. Rolls have run 14,000 parts without redressing. In another plant, Reducerolling is an essential part of what



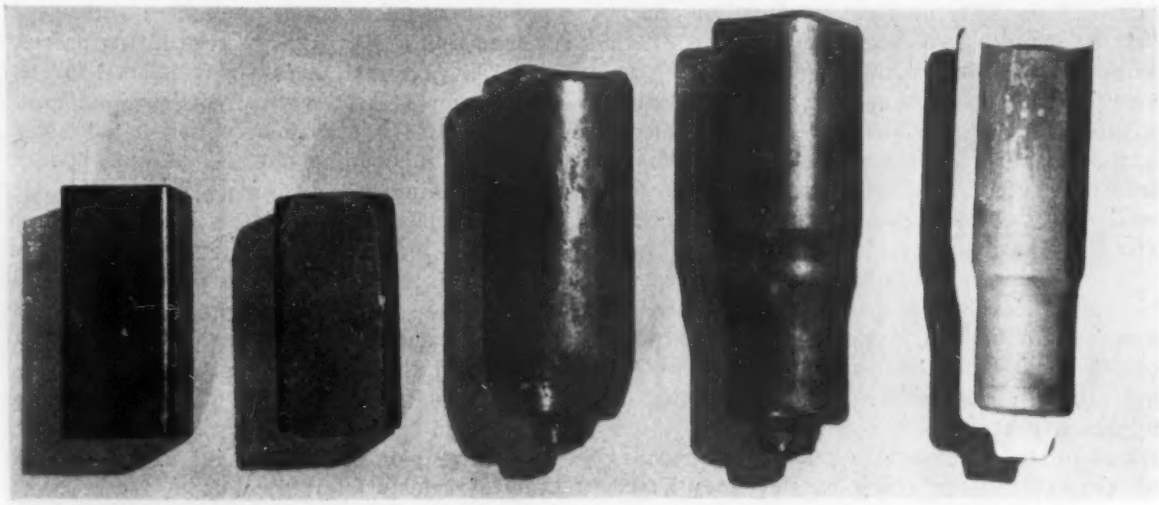
ODD-SHAPED parts are made in multistation progressive cold headers to close tolerances 15 times faster than by machining.

is probably the most fully automatic press forging operation in the country.

Economy must go hand-in-hand with increased production to satisfy the demands of both forgers and customers. An excellent example is an automotive brake pedal which is elongated in two rolling passes prior to finish forging on the same heat.

Formerly, the long bar had to be heated. Material was gathered in an upsetting machine. The bar was then reheated and finish-forged. This operation resulted in a forging weighing 5 lb 2 oz. Using the new method, a smaller piece of bar stock is Reducerolled, followed by finish forging on the same heat. The finished forging weighs only 4 lb 7 oz, a saving of 11 oz per forging. An entire heating operation is eliminated and production rates have been increased.

While complete automation has not been achieved in this operation, performing on rolls is a step in this direction. Where 100-pct automation can be justified, however, preliminary rolling and finish press forging offer the most practical approach.



ROCKET HEADS are hot-forged economically from round-cornered square stock. After centering and scale-breaking blow, blank is hot extruded to form the finished forged part. It is extruded to a heavy wall thickness, then drawn to smaller diameter and thickness at the end.

In machine tools—

Built-In Gaging Parallels Automation Growth

◆ Built-in gaging devices are the "traffic cops" of modern, automated machine tools and transfer lines . . . They warn of approaching out-of-tolerance conditions, automatically reject faulty parts, stop machines if too many parts come over or undersized . . . Gages are widely used to spot errors and sound the alarm through electrical signaling systems.

◆ Most automatic gaging is built in to follow a machining station, permitting only acceptable parts to be transferred on for more work . . . Some sizing-control units on automated grinding setups work during the grinding cycle, stop it when finished size is reached . . . Gaging stations can be set to check one or several parts at a time.

By **Elwood Byrkett,** Supervisor of Research Engineering, The Sheffield Corp., Dayton

◆ AUTOMATION implies accuracy to the same degree that it means fast, low-cost production. The automated machine tool or transfer line must feature equally automatic work-sizing controls to fully utilize its high speed potential. Rapid machining cycles do not allow time for parts to be measured at remote, or even nearby, work stations.

Built-in automatic gaging which functions during or immediately following specific machining operations is sometimes referred to as "closed loop control." The ideal function of any "closed loop" or machine sizing control which works *during* the machining process is to provide (1) a signal to stop or change from a roughing to a finishing cut when a predetermined dimension is obtained; (2) a signal to retract the cutting tool when the part is to finished size; (3) a signal to stop the machine after cutting tools become worn.

When sizing control *follows* the metal removing operation the ideal system would supply (1) a signal for tool adjustment when parts come outside mean blue print specification yet within overall tolerance; (2) a signal to remove out of tolerance parts caused by tool failure; (3) a signal to stop the machine if a specific number of consecutive parts are outside established limits; (4) an impulse to stop the machine when cutting tools become worn.

Some factors occasionally make it impractical to use all desirable features of sizing controls. These factors include (1) the type of cutting tools used; (2) the problem of processing a part which is not mounted on a pallet or work-holding fixture; (3) the number of parts being produced simultaneously; (4) the size of the part; (5) the dimension to be controlled.

Use of fixed-size tools such as drills, reamers, etc., nullifies the value of a sizing adjustment signal. With these tools signals that warn of size deviation and the need to change tools, before faulty parts are produced, should be used.

Some odd-shaped parts require the use of work-holding fixtures or pallets during processing. The fixtures may make it difficult to eject out-sized parts automatically. If both pallet and faulty parts are ejected, pallets must be returned to the loading station.

In machining and gaging a number of parts on a common pallet, automatic ejection problems are increased still further. The general practice in sizing control of palletized parts is to have the faulty part stop the machine for manual removal of the workpiece. Where the controlled dimension will not affect subsequent operations, the parts can be marked for removal at the end of the cycle.

A large part may also make automatic ejection of rejects impractical from a cost standpoint. It would generally mean an additional station or stations which would increase equipment cost and take up extra floor space. Therefore sizing controls applied to this type of part

are usually set to stop the machine so that the faulty part can be manually removed. Here, too, when the controlled dimension does not affect subsequent operations, the parts can be marked and removed at the end of the process.

Choose signal suited to work

The dimension controlled by the sizing device also has a bearing on the type of control signals given. For example, in gaging center distance between holes, the concentricity of two diameters or the squareness of a hole to a face would make tool adjustment signals difficult to use. For this type of gaging a warning signal is best combined with a signal to remove faulty parts from the line automatically or to stop the machine.

Some interesting applications of automatic gaging for machine control are found in automated lathe setups for turning multiple diameters. One recent example is a Lo-swing lathe developed to turn seven diameters on an automotive camshaft.

Shafts to be turned are placed on an inclined ramp and roll to an automatic loading device. They are automatically positioned in the first turning station which sizes three diameters, after which they are elevated into the first sizing control station.

This control point gages the three diameters with specially designed snap gages. Each gage mounts a Sheffield Electrichek head which mechanically amplifies dimensional changes in the turned diameters. Out of tolerance parts produce signals from the gage heads which stop the turning operation. The outsized part remains in the gaging station while signal lights indicate which diameter is out of tolerance and whether the high or low limit has been exceeded.

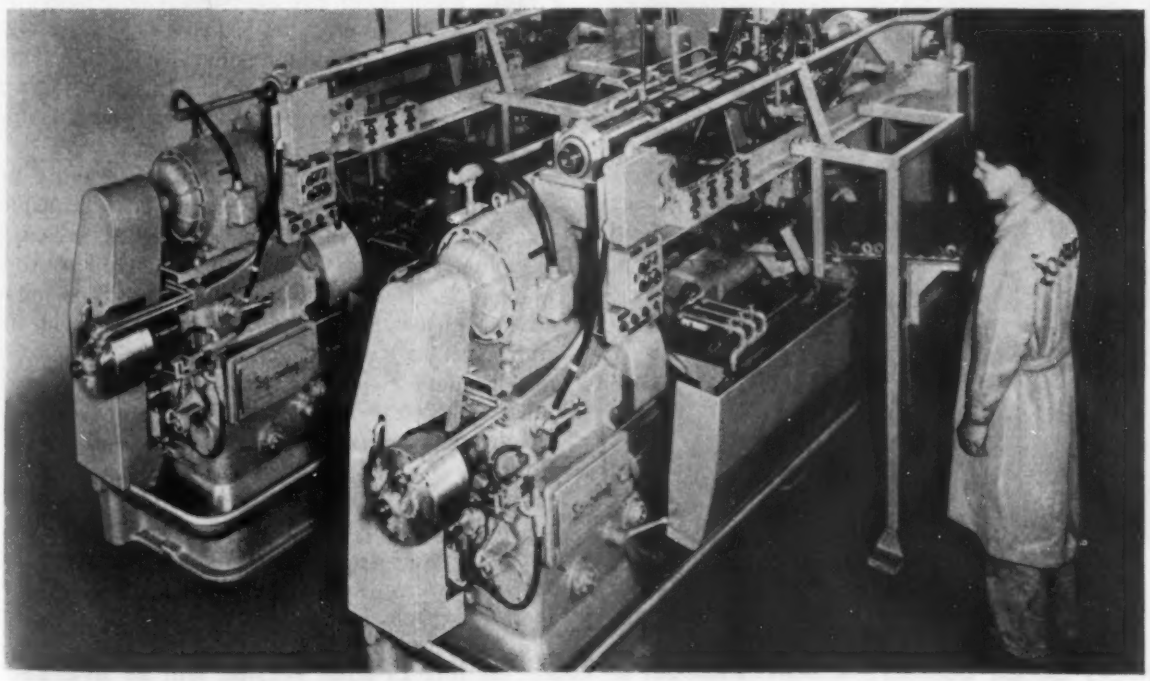
Each gaging snap embodies protective features so that it cannot be damaged by contact with unturned surfaces such as might result from an undetected broken tool. The gaging circuit is designed so the machine can cycle with the gaging station empty. "In tolerance" parts are automatically unloaded from the gaging station and banked for loading into the second turning cycle.

Other machine sizing controls are applicable to transfer machines which process a number of parts simultaneously. One such machine performs a number of operations on eight automotive connecting rods at a time. Sizing controls were applied to the bored pin holes to assure the proper press fit of bushings automatically inserted in the next operation.

The sizing control station was placed adjacent to the boring station. The gaging setup consists of eight air spindles connected pneumatically to an equal number of Sheffield Airlectric heads which are sensitive pressure switches.

Signals consist of individual warning lights for each gaging plane of each hole when hole size approaches the high or low limit. The setup man can observe size trends and reset tools before faulty parts are produced. Another signal is used to automatically reject out of tolerance parts in the following station.

This sizing control has several additional features. A high pressure, high velocity air blast from the lead-end periphery of the air spindles aids in chip removal. A spring-urged feature also allows each air spindle to retract within its sleeve in the event a broken tool produces a hole smaller than the spindle.



BUILT-IN gages in this transfer lathe setup check seven diameters on automotive camshafts.

"Size controls can be used on transfer machines which produce several parts simultaneously . . ."

Limit switches on each air spindle are actuated when a part is presented for gaging. This allows the transfer machine to cycle without parts in the gaging station. Finally, gaging dials permit visual observation of exact hole size. When all eight connecting rods are in tolerance, they are automatically transferred to subsequent operations.

Control center distance

Still other variations of built-in machine-sizing units are used to control center distance between holes. These assemblies may also gage hole size at the same time. An application of this setup is found on a modern Holeway machine which processes automotive cylinder heads.

The first of three size control stations on this machine checks center distance between two reamed holes while it gages hole size. It consists of two air spindles mounted on a common carrier which floats to compensate for slight mislocations of the part in the gage station.

If any part is off-tolerance the machine is automatically stopped with the air spindles in gaging position. Lights indicate the cause of the stoppage and the faulty dimension. Out of tolerance parts are removed manually while dimensionally correct work is automatically transferred to subsequent operations.

Automatic boring tool adjustment is an interesting feature of built-in gaging as it is applied to a multiple station Bore-Matic machine. This transfer assembly was developed to process and gage two automotive pinion gear blanks simultaneously.

HONED PARTS are automatically segregated by size. Off-tolerance parts stop the machine.

The first machining cycle rough bores and faces one side of the gear blanks, after which the parts roll to individual gaging stations. Ball jet air spindles are automatically urged into the bored holes. The air spindles are connected to separate gaging heads which electrically produce a size signal and a rejection impulse when a hole is larger or smaller than the specified limit.

Any out-of-tolerance part induces another impulse which automatically adjusts the boring tool in a compensating direction. Three consecutive out-of-tolerance parts from the same boring bar will cause the machine to stop.

Properly sized parts are conveyed to the second machining station after which they are again automatically gaged. Parts slightly off mean part print size cause the gaging device to signal for automatic tool compensation. Parts exceeding either limit are removed from the machine. In-tolerance parts roll out of the machine ready for further processing.

Automatic "Microhoner" machines represent still another machine tool type which has utilized sizing controls on a variety of parts.

On these machines, a vibrating parts feed automatically moves parts down a chute to the work table where they are fed into honing position. After honing, parts move automatically to the gaging station.

The gaging station utilizes machine movement to present the air spindle to the part. The air spindle is connected pneumatically to an Airlectric head to produce warning signal lights when holes are just under maximum or just over minimum part print size. Sizing signals segregate over and undersized parts. This gaging control also shuts the machine down whenever three consecutive out-of-tolerance parts are produced.

The in-process type of automatic gaging or machine-sizing control is part of the multiple station automotive crankpin grinder recently developed by The Norton Co. (THE IRON AGE, April 22, 1954, p. 187). Crankshafts are positioned automatically and the grinding cycle is initiated. At a predetermined time, a pneumatic gaging device is applied directly to the crankpin as it is being ground.

As the crankpin approaches final rough ground size, a signal from the gage control stops the roughing feed. The grinder continues with a finishing cut until final size is ground. At this point another gaging signal automatically retracts the wheel slide to complete the grinding cycle.

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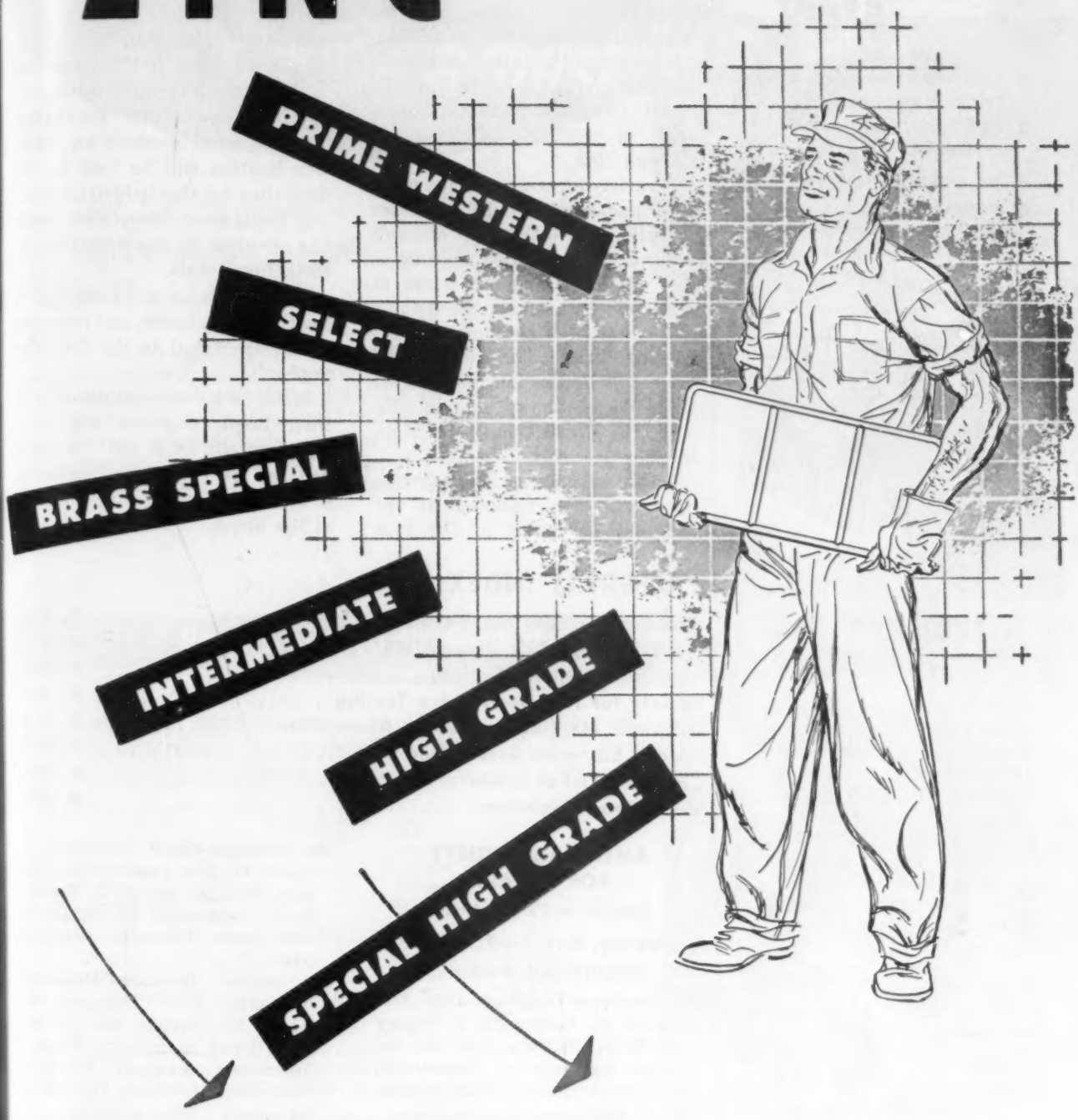

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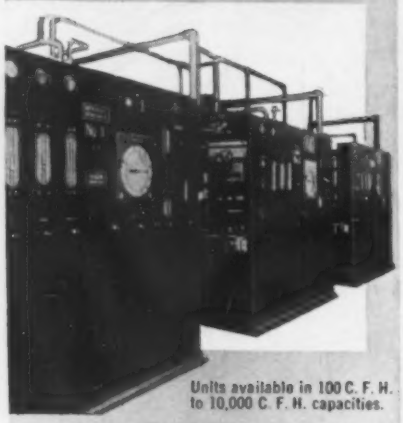

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National Metal Show

Technical papers and industrial exhibits mark metalworking progress at the 36th National Metal Congress and Exposition . . . Chicago will play host to visiting metalworking executives and engineers.

Up to date technical information will be presented to the nation's metalworking executives and engineers at the 36th National Metal Congress and Exposition held in Chicago, October 30 through Nov. 5.

A variety of new products, processes and services will be shown by well over 400 firms at Chicago's Internal Amphitheatre, Halsted at 33rd St. More than six acres of space will be used for the display and operation of equipment by exhibiting firms. The 1954 Metal Show will be the 9th and largest of the Metal Shows held in Chicago. The Exposition opens Monday morning, Nov. 1.

Technical papers and discussions will be presented at the headquarters hotels of the four participating societies: the American Society for Metals; Institute of Metals Div., AIME; American Welding Society and the Society for Non-Destructive Testing. Three special sessions on induction heating will be held for the first time by the Industrial Heating Equipment Association under the auspices of the American Society for Metals.

For details on technical papers see the index, below, and programs which are listed on the following pages.

Metal Show exhibitors with their booth numbers are listed alphabetically on p. 289. A classified list of exhibitors begins on p. 274 to help you plan your visits at the Show.

PROGRAM INDEX:

American Society for Metals ..... P. 238
Institute of Metals Div.—AIME ..... P. 257
American Welding Society ..... P. 265
Society for Non-Destructive Testing ..... P. 270
Industrial Heating Equipment Association ..... P. 272
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Classified List of Exhibitors ..... P. 274
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AMERICAN SOCIETY FOR METALS

Sessions at Palmer House

Monday, Nov. 1—9:30 a.m.

CONSTITUTIONAL DIAGRAMS

The Aluminum-Vanadium Alloy System—O. N. Carlson, D. J. Kenney and H. A. Wilhelm, Institute for Atomic Research and Department of Chemistry, Iowa State College, Ames, Iowa.

Partial Phase Diagram of the Iron-Cerium System—James O. Jepson, Research Engineer, Jet Propulsion Laboratory and Pol Duwez, Prof. of Mech. Engineering and Chief of Materials Section of Jet Propulsion Laboratory, California Institute of Tech., Pasadena.

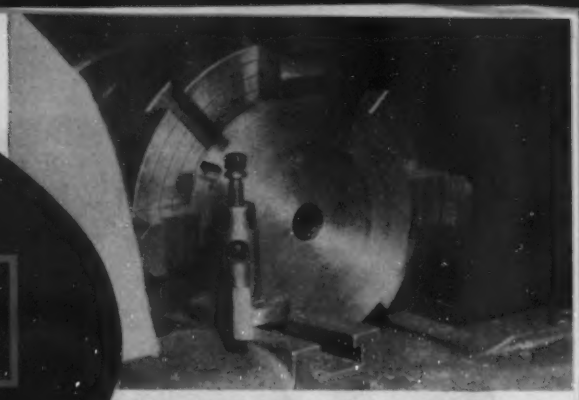
The Titanium-Cobalt System—F. L. Orrell, Jr., Dow Chemical Co., Midland, Michigan and M. G. Fontana, Head, Department of Metallurgy, Ohio State University, Columbus, Ohio.

The System Titanium - Aluminum - Manganese—R. F. Domagala, Associate Metallurgist and W. Rostoker, Senior Metallurgist, Research Department, Armour Research Foundation of Illinois Institute of Technology, Chicago, Illinois.

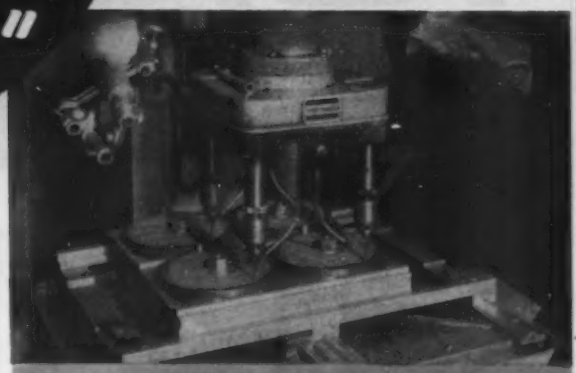
Constitution of Ordering Alloys of the System Copper-Gold—F. N. Rhines, Professor of Metallurgy, W. E. Bond, Research Assistant, and R. A. Rummel, Laboratory Assistant, Metals Research Laboratory, Carnegie Institute of Technology, Pittsburgh, Penna.

for these parts at
Pittsburgh-Erie Saw Corp . . .

"Latrobe's FM Steel a must"



Photographs Courtesy of Pittsburgh-Erie Saw Corp



Tool life increased 40% when machining Latrobe's "Free-Machining" BR-4 FM at Pittsburgh plant.

Pittsburgh-Erie Saw Corp., Pittsburgh, Pa., reports . . . "Because of the greater ease of machining BR-4 FM, we are reducing our production costs and especially increasing our drill life. Savings in production time combined with greatly increased tool life makes Latrobe's FM steel a must."

Pittsburgh-Erie's experience is another example of the cost-saving benefits derived from using Latrobe's "Free-Machining" FM high alloy tool steels. These FM steels—high carbon-high chromium die steels with sulphide additives evenly distributed as a result of the "Desegatized" process—consistently result in improved machinability, better machined surfaces and production economy through savings in time, labor and tool life.

Results of Specially Conducted Test by Pittsburgh-Erie

Under the same production conditions, the performance of Latrobe's BR-4 FM die steel (with sulphide additives) was compared to that of a regular high carbon-high chromium die steel of similar analysis and hardness.

ROUGHING CUT

	OTHER STEEL	BR-4 FM
Speed	180 RPM	392 RPM
Feed	.014 in.	.024 in.
Depth of Cut	1/16 in.	1/16 in.

FINISHING CUT

Speed	180 RPM	392 RPM
Feed	.014 in.	.010 in.
Depth of Cut	.015 in.	.015 in.

DRILLING TIME

Hole Size 1/8" Plate Thickness 3/4" Hand Feed

BR-4 FM—23 seconds per plate per one hole.
Other Steel—45 seconds per plate per one hole.

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Monday, Nov. 1—2:00 p.m.

MECHANICAL METALLURGY

The Effect of Prestraining Under Different Stress States on the Fracture and Flow Properties of 2S-0 Aluminum—I. Rozalsky, Wood River Res. Lab., Shell Oil Co., Wood River, Ill.

Metallographic Exhibit

The ninth Metallographic Exhibit of the American Society for Metals will be held at the National Metal Congress and Exposition in Chicago, Ill., during the week of November 1-5, 1954. Contest entries will be limited to entirely new exhibits. Judges appointed by the Metal Show management will make the awards.

Eleven classifications of micros are designated for the contest. These include: Tool steels and tool materials; stainless and heat resisting steels; other steels and irons; aluminum, magnesium, beryllium, titanium and their alloys; copper, zinc, lead, nickel and their alloys; metals and alloys not otherwise classified; series showing transitions or changes during processing; surface phenomena; results by unconventional techniques (other than electron micrographs); slags, inclusions, refractories, cermets.

A committee of judges, appointed by the Metal Congress management, will award a first prize (medal and blue ribbon) to the best entry in each classification. Honorable mention with appropriate medal will be awarded to those closely approaching these winners.

A Grand Prize (engrossed certificate and $100 cash) will be presented to the exhibitor whose entry is adjudged best in the show. The Grand Prize entry becomes the property of the American Society for Metals.

Tensile and Impact Properties of Low Carbon Martensites—C. C. Busby and H. W. Paxton, Metals Res. Lab., Carnegie Institute of Technology; M. F. Hawkes, Quality En-

Proof of *INCREASED PREFERENCE for WISCONSIN HEAVY-DUTY Air-Cooled ENGINES

3 TO 36 H.P. Range

*Based on U. S. Bureau of Census Statistics, Wisconsin Motor Corporation leads the engine industry with 50.72% of total production in 11 to 176 cu. in. displ. bracket — an industry-wide gain of 1.33%, as summarized below.

Once more U. S. Bureau of Census statistics provide authentic proof of outstanding preference for Wisconsin Air-Cooled Engines in the internal combustion engine field.

The latest "Facts for Industry" census report, released July 19, 1954, reveals the interesting fact that Wisconsin Motor Corporation produced 5,605 MORE engines in the 11 to 176 cu. in. displ. census grouping than ALL other internal combustion engine manufacturers combined, during 1953. This refers, of course, to engines built for re-sale, exclusive of automotive, aircraft, outboard, miniature and "captive" engines.

Translated into industry-wide percentages, census figures indicate that this company showed a gain of 1.33% over the combined production of all other engine builders. This, however, is an ultra-conservative figure inasmuch as the Wisconsin line covers a range of 13.5 to 154 cu. in. piston displacement whereas the Census Report grouping covers engines from 11 to 176 cu. in. displacement. In spite of this fact, Wisconsin Engine production amounted to 50.72% of the Industry's total in above grouping.

Statistically, these figures are interesting to us as evidence of consistent progress. To the Original Equipment Builder, Distributor and User of engine power, this report provides definite proof of INCREASED PREFERENCE for Wisconsin Heavy-Duty Air-Cooled Engines among people who are best qualified to judge comparative engine values in terms of performance, economy and low-cost maintenance.

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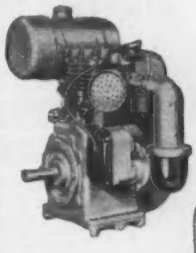
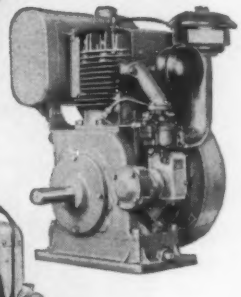
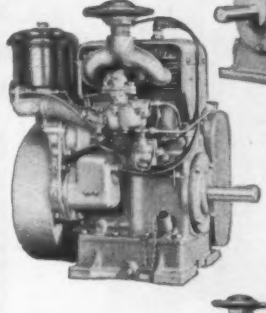


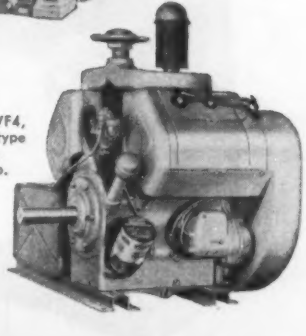
Models ABN, AKN, AEN, 4-cycle single cylinder, 3 to 8¼ hp.



Models AFH, AGH, AHH, single cylinder, 6 to 9 hp.



Models TE, TF, TFD 2-cylinder 7 to 15 hp.



Models VE4, VF4, and VG4D, V-type 4-cylinder, 15 to 36 hp.

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gineering Laboratory, U. S. Naval Ammunition Depot, Hawaii.

The Tensile Characteristics of Unalloyed Zirconium at Low and Moderate Temperatures—J. H. Keeler, Research Laboratory, General Electric Co., Schenectady, N. Y.

Monday, Nov. 1—2:00 p.m.

PROCESSING

The Influence of Chemical Composition of the Machinability of Rephosphorized Open Hearth Screw Steel—E. J. Paliwoda, Research Engineer, Metal Research Division, Jones & Laughlin Steel Corp., Pittsburgh, Penna.

The Influence of the Grinding Process on the Structure of Hardened Steel—W. E. Littmann, Research Metallurgist, The Timken Roller Bearing Co., Canton, Ohio and John Wulff, Professor of Metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

The Zonal Rolling Texture of Low Carbon Steel Cold-Rolled at Various Temperatures—C. Nusbaum, Associate Professor of Physics, Case Institute of Technology and Consultant of the Cold Metal Products Company and W. Brenner, Jr., Metallurgist, The Cold Metal Products Co., Youngstown, Ohio.

Tuesday, Nov. 2—9:30 a.m.

HARDENABILITY

An Electron Metallographic Study of the Dependance of Microstructure on Hardenability—S. T. Ross, Project Engineer, R. P. Sernka, Research Metallurgist and W. E. Jominy, Chief - Metallurgical Research, Chrysler Corp., Detroit.

Calculation of Hardenability in High Carbon Alloy Steels—C. F. Jatczak and R. W. Devine, Jr., Research Metallurgists, The Timken Roller Bearing Co., Canton, Ohio.

The Hardenability of Carbon Tool Steel—N. J. Culp, Metallurgical Department, The Carpenter Steel Co., Reading, Pa.

Effect of Carbon and Nitrogen on the Attainable Hardness of Martensitic Steels—A. E. Nehrenberg, P. Payson and P. Lillys, Research Laboratory, Crucible Steel Company of America, Harrison, New Jersey.

Tuesday, Nov. 2—2:00 p.m.

PHYSICAL METALLURGY

Conditions for Dendritic Growth in Alloys—W. Morris, W. A. Tiller, J. W. Rutter and W. C. Winegard, Department of Metallurgical Engineering, University of Toronto, Toronto, Canada.

Stress-Corrosion Mechanism in a Magnesium - Base Alloy — D. K. Priest, Pfaudler Company, F. H. Beck, Assistant Research Professor, and M. G. Fontana, Professor, Department of Metallurgy, Ohio State University, Columbus, Ohio.

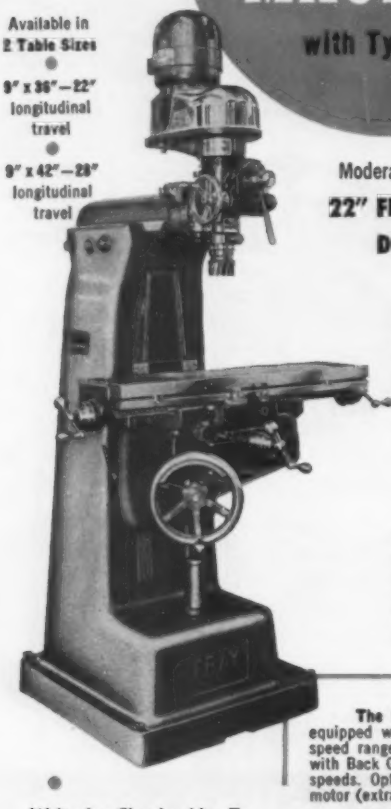
Turn to p. 254.

Model 1½ V Ram-Type Vertical

Fray

MILLING MACHINE

with Type 4 Precision Milling Head



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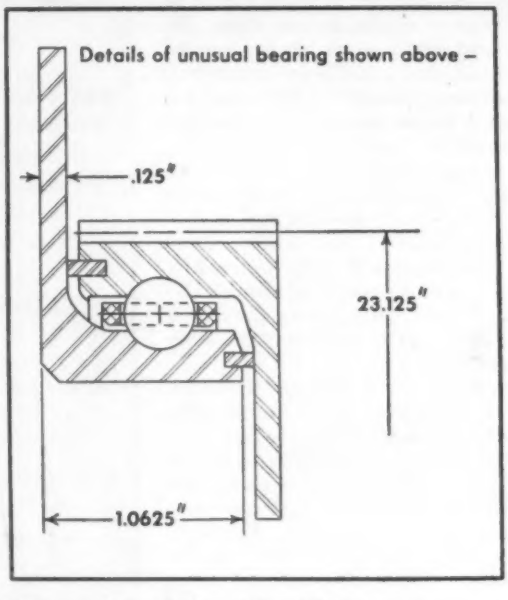
These *Reali-Slim* thin-section bearings are typical of the outstanding job KAYDON does to solve tough bearing design problems. Bearings of this particular type are currently being adapted by KAYDON for a host of aircraft, radar equipment, and guided missile applications. Note the unusual ⅛" flanges and the fact that the gear teeth extend through only 130°. Then, too, these bearings feature integral seals which are built into the bearing.

When you're faced with a difficult problem involving unusual bearing design, take advantage of KAYDON's specialized experience in developing and mass-producing thin-section high-precision bearings. Write, wire or phone. A KAYDON expert will be pleased to cooperate, help you get the job done faster, better and probably at less cost.



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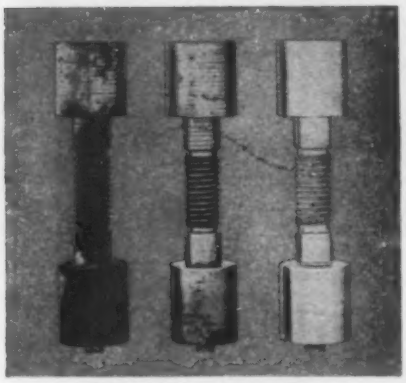

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Look at these steel samples—they tell the story. After 3 years of unsheltered storage outdoors in an industrial marine atmosphere, only the VPI wrapped sample on the right is still bright and clean. The untreated sample on the left was wrapped in plain kraft, the middle one treated with a good rust-preventive oil and wrapped in Grade A barrier material. All were overwrapped with kraft-asphalt paper.

A special coating on the VPI paper vaporizes . . . forms an invisible protective film that positively prevents rust.

Marvellum VPI is easy to use . . . just fold the paper over the part. No need for time-consuming slushing or greasing. No mess or costly cleaning when the item is unwrapped. It's bright and clean, ready for immediate use.

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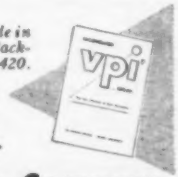
Marvellum VPI is available in rolls of 20, 30, 40 and 60 lb. paper stock and can be individually imprinted with your trademark on quantity orders. Envelopes, sheets, bags, shrouds and tubes are also available.

Marvellum VPI Wrap is made in compliance with Military Packaging Specification MIL-P-3420.



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New Technical Literature

Waste treatment

The advantages of the treatment of industrial waste waters and process liquors are described in this new bulletin. The solution of such problems as process and cooling water shortages, contamination of streams with plant effluents, and the loss of valuable heat and materials in discarded waters and process liquors, are discussed. Emphasized are the uses for the petroleum, metal plating and paper industries. *Graver Water Conditioning Co.*

For free copy circle No. 16 on postcard, p. 245.

Single-pan balances

The theory and operation of single-pan balances are given in this illustrated bulletin. The Micro Gramatic Balance is covered, as well as a special-purpose single-pan balance for weighing large samples of paper, sheets of dried paint, film, cloth and other materials. *Fisher Scientific, Ltd.*

For free copy circle No. 17 on postcard, p. 245.

Metagraphic

The complete line of Metagraphic recording automatic controlling, and telemetering instruments is covered in this illustrated bulletin. These instruments divide the functions of measuring, recording, and controlling into three separate instruments. The quick-inter-changeability of recorders and indicators is stressed. *Bristol Co.*

For free copy circle No. 18 on postcard, p. 245.

Geared presses

The line of Niagara straight side, single action, eccentric geared presses is introduced in this new bulletin. Several features, such as the crankless eccentric drive, tie rod frame construction, low inertia pneumatic friction clutch, air releasing brake and adjustable air counterbalance, are described. Tabulated specifications are given. *Niagara Machine & Tool Works.*

For free copy circle No. 19 on postcard, p. 245.

FOR YOUR COPY

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, page 245.

Metal quenchi

Information on the quenching metals is given in this book Cooling, bath temperature, agitation information is given charts and graphs. A series case studies detail the solution some quenching problems. *Oil Corp.*

For free copy circle No. 20 on postcard, p.

Rust treatm

OSPHO, a rust-inhibiting prim is discussed in this new broch Stressed is the fact that OSPH not a paint, but a metal treatm which stops rust action. It ma applied directly over rust. *cide Products Co.*

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Electric cra

The Euclid line of electric cr is covered in this new illustr booklet. The trolley line and bri and end truck construction are cussed. Special cranes are sh as well as typical cranes. Sp fications are included. *Crane & Hoist Co.*

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Coolant fil

The Kleenall combination magn and fabric filter is illustrated discussed in this new bull Laboratory facilities, applicat engineering, and testing serv to help solve coolant cleaning p lems are discussed. Applicatio formation is given. *Barnes Co.*

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Catalogs & Bulletins

Diffusion pumps

The Naresco line of diffusion pumps is described in this new catalog. The catalog gives the characteristics of each pump, including pumping speeds, operating pressures, blank-off pressures, and forepressure limits. Operating charts on throughput and inlet pressures, as well as photographs and drawings, are included in the catalog. *Naresco Equipment Corp.*

For free copy circle No. 24 on postcard, p. 245.

Grinding wheels

An assortment of standard sizes of diamond grinding wheels and hones is contained in this catalog. Information is given on diamond wheel markings, selection of wheels, and standard shapes of wheels, and suggestions are given on the use of diamond wheels and hones. Specifications are included. *Norton Co.*

For free copy circle No. 25 on postcard, p. 245.

Battery maintenance

This is a technical training manual on lead-acid storage batteries for electric industrial truck use. The material in the manual was the basis of a traveling maintenance school which visited major industrial centers in the nation recently. The manual contains pictures, diagrams and tables with storage battery information. *Gould-National Batteries, Inc.*

For free copy circle No. 26 on postcard, p. 245.

Permacel tapes

The flexibility of self-sticking tapes in saving time, money, and facilitating better packaging, is described in this new brochure. The specific uses and advantages of the different types of packaging tapes, including cellophane, strapping, cloth paper, acetate fiber and plastic tapes, are described. *Parmacel Tape Corp.*

For free copy circle No. 27 on postcard, p. 245.

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Continental Twin-Chamber Annealer of the recirculating type with automatic conveyor transfers and close tolerance control for time-temperature cycle.

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Continental Stamping Annealer, continuous roller rail type, complete with baskets, handling convevors, and automatic controls for work handling and temperature cycles.

Six Continental "Top Hat" Cover Type Furnaces for bright annealing high carbon steel complete with gas generator and automatic controlled time-temperature cycling.

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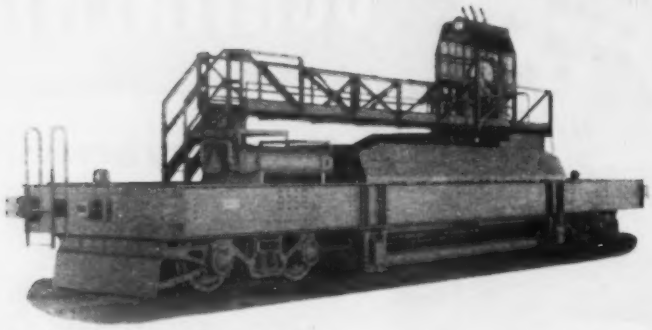
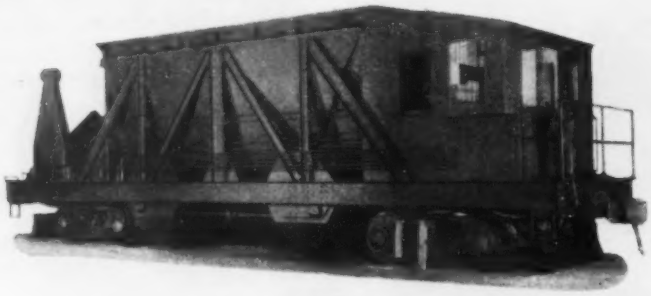


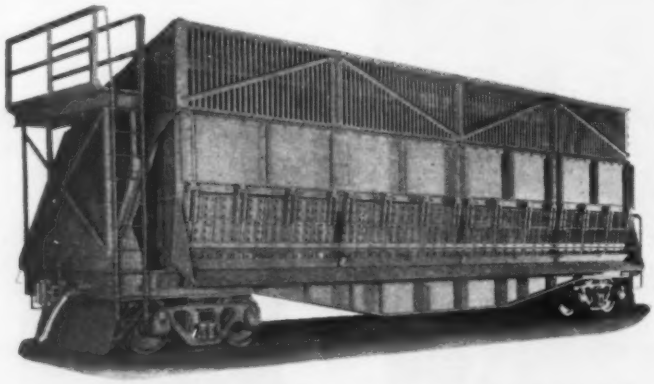
30 Ton Double Hopper Bottom Scale Charging Car. Operator's platform is above hopper to facilitate bin operation.

SCALE CARS



ORE TRANSFERS

60 Ton Center Bottom Dump Ore Transfer Car. Equipped with pneumatically operated balanced type pusher arm.



Coke Quenching Car.. Motor-operated cast steel discharge gates. Bottom, ends and front are abrasive resistant steel plates.

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Thermodynamics of Binary Interstitial Solid Solutions—R. Speiser, Associate Professor, Department of Metallurgy, Ohio State University

Influence of Substructure on the Shape of the Creep Curve—T. Hazlett and R. D. Hansen, Research Engineering Department, University of California, Pasadena.

Wednesday, Nov. 3—9:00 a.m.

ASM ANNUAL MEETING

Campbell Memorial Lecture

Kent R. Van Horn

Aluminum Company of America

Wednesday, Nov. 3—2:00 p.m.

FERROUS PHYSICAL METALLURGY

Further Study of Microstructural Changes on Tempering Iron-Carbon Alloys—B. S. Lement, Research Staff (Division of Industrial Cooperation) B. I. Averbach, Associate Professor and M. Cohen, Professor of Physical Metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

Effects of Cold-Work on Cementite in Steel—D. V. Wilson, Lecturer, Department of Industrial Metallurgy, Birmingham University, Edgbaston, Birmingham, England.

The Isothermal Transformation of Austenite Under Externally Applied Tensile Stress — S. Bhattacharyya and G. L. Kehl, Associate Professor of Metallurgy, Columbia University, New York.

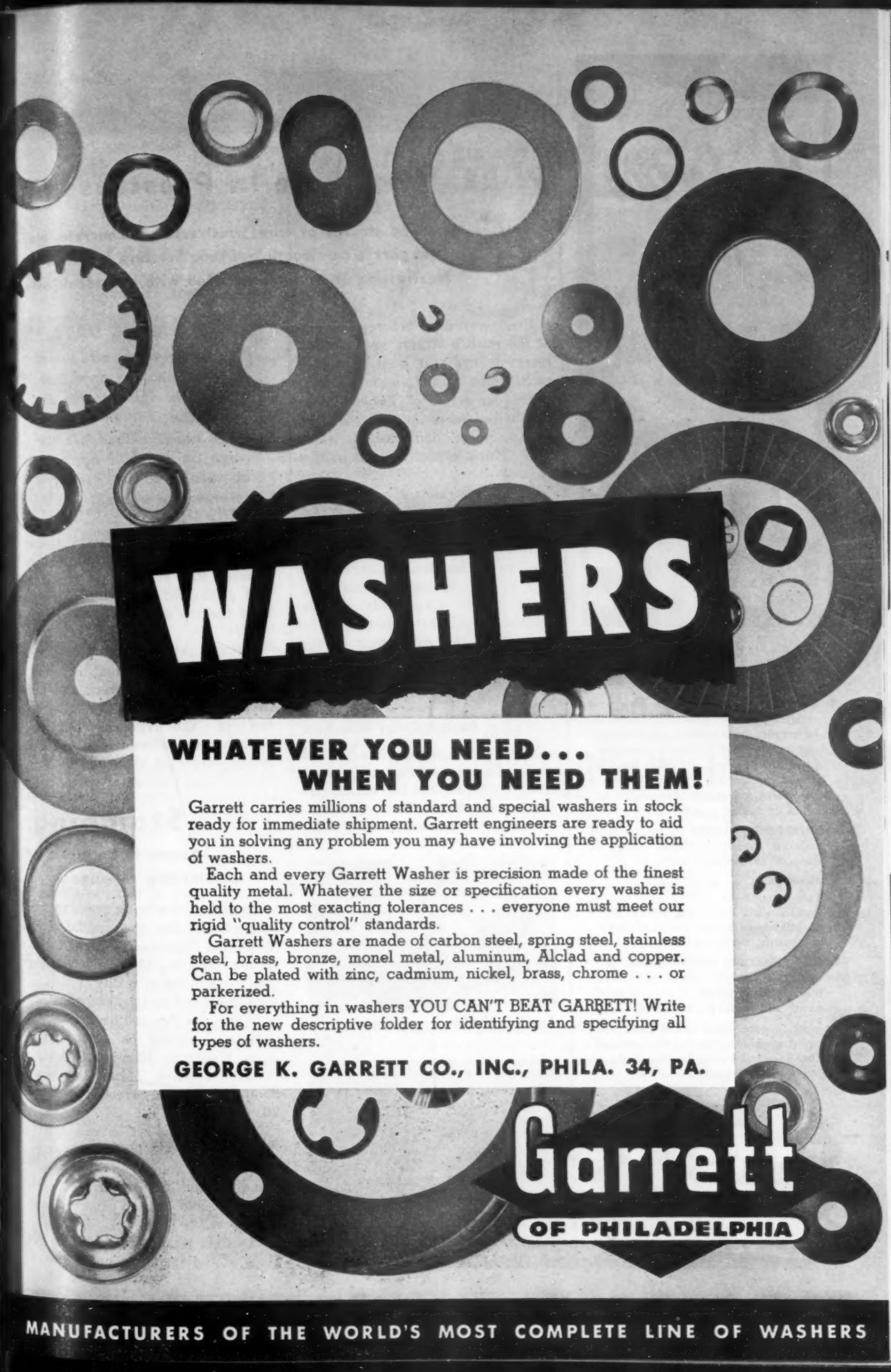
Wednesday, Nov. 3—2:00 p.m.

MECHANICAL PROPERTIES

The Elastic Limit and Yield Behavior of Hardened Steels—H. Muir, Senior Lecturer, Otago University, Dunedin, New Zealand; B. L. Averbach, Associate Professor and Morris Cohen, Professor, Department of Metallurgy, Massachusetts Institute of Technology, Cambridge.

Effect of Composition on Transverse Properties of Slack-Quenched Steel—J. Vajda and P. E. Busby, Metals Research Laboratory, Carnegie Institute of Technology, Pittsburgh, Pa.

The Statistical Fatigue Properties of Lamellar and Spheroidal Eutectoid Steel—G. E. Dieter, Ordnance Corps; R. F. Mehl, Director, Metals Research Laboratory and G. T. Horne, Metals Research Laboratory, Carnegie Institute of Tech-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WIRE: Vital Role In Prestressing

Imbedded strands of wire, prestressed in concrete, play an important part in construction of huge Western reservoir . . . Prestressing operation completed with individual jacks.

Prestressing of concrete on one of the world's largest covered tank reservoir has just been completed at Richmond, Calif., with the placing under stress of 144,000 lb of wire imbedded in the concrete walls of the huge dome-roofed water tank. Tank capacity is 12 million gals.

Eighteen strands of special composition high tensile Super Tens-stress relieved wire, made by United States Steel's American Steel and Wire Div. are encased in each of 320 vertical and 360 horizontal prestressing conduits in a checkerboard construction pattern throughout the entre wall of the tank. Contractor on the project is Erickson, Phillips, and Weisberg, of Concord, Calif.

Spaced Every Two Feet

The vertical conduits, constructed on 1½ in. steel tubing, are spaced every 2 feet around the entire circumference of the tank. Horizontal cables, constructed of 1¾ in. flexible metal conduit, are spaced 3½ in. apart at the bottom, where greater wall strength is required, and graduated to a 20-in. spacing near the top of the 44-ft reservoir wall.

Actual prestressing operations, set up with individual hydraulic jacks placed at each protruding end of the horizontal cables and at the top of the vertical conduits, stretched the wires to the required initial stress at the ends of both vertical and horizontal wires.

Jacks tighten wires . . .

To prestress concrete . . .

WANT MORE DATA?
You may secure additional information on any item briefed in this section by using the reply card on page 245. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

Stamping:

Award to be given for outstanding redesign work.

Engineers are being urged to submit entries for the annual John Woodman Higgins Redesign Award before Dec. 31, 1954. The request was made recently by Carter C. Higgins, president and general manager of Worcester Pressed Steel Co.

Entries should be sent to the John Woodman Higgins Redesign Award, Pressed Metal Institute, 2860 East 130th Street, Cleveland 20, Ohio.

The new competition was established to honor the individual selected as having done original and outstanding redesign work in the metal stamping field. A cash prize of $500 dollars will be offered.

The first Higgins award, will be made at the spring technical meet-

ing of the Pressed Metal Institute in May, 1955, and will be based on the following: successful production by metal stamping for a part previously turned out by another process; originality of design; and significant cost savings realized in the changeover to metal stamping.

Straightening:

Piston lift drop hammer straightens, coins castings.

Higher production, fewer rejects, downtime, and operator fatigue have resulted from use of piston lift type drop hammer in the straightening or coining of malleable iron castings.

Several foundries have recently adopted the Cecostamp, an air operated piston-lift gravity drop hammer made by Chambersburg Engineering Co., Chambersburg, Pa., for straightening and coining malleable iron castings. One company which had been using an older type hammer for straightening had many rejects because of its inaccuracy. It was also very tiring to the operator. Use of the piston type hammer has practically eliminated rejects and operator fatigue from the operation.

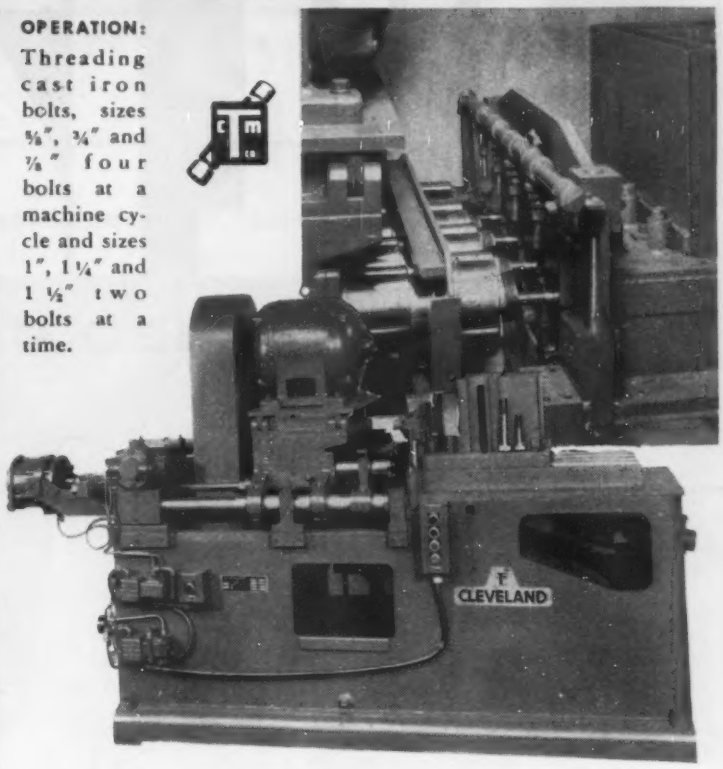
Stroke Easily Adjusted

Another company changed to the piston type hammer because it found it difficult to maintain proper adjustments and impossible to quickly change the stroke with an older type drop hammer. Work stoppages for adjustments and stroke set-up prohibited piecework production. With the Cecostamp, the flexible blow control permits any variation of stroke required, with no time out for friction or stroke adjustments. Maintenance costs are low and piecework production is profitable both to the operator and to the company.

Dies may be of cast iron or machined tool steel. The die material is usually determined by the shape of the casting. Dies requiring expensive machining are generally cast. Simpler shapes such as disks to be coined use machined tool steel dies.

Another Cleveland Design to Speed Production!

OPERATION: Threading cast iron bolts, sizes ⅝", ¾" and ⅞" four bolts at a machine cycle and sizes 1", 1¼" and 1½" two bolts at a time.



CLEVELAND BOLT THREADING MACHINE

Produces 857—⅝"—11 Pitch Cast Iron Bolts per hour @ 100% Efficiency

DESCRIPTION: A Horizontal Four-Spindle Machine with magazine loaded feeders for automatically feeding and discharging cast iron bolts. On the rear of the base the drive unit and four-spindle head is mounted. The four-spindle head has four spindles mounted in a cast iron housing geared to drive together from a drive shaft on the rear of the housing. The spindle assembly mounted on heavy round hardened and ground ways to move forward and back at the back of the drive assembly housing the drive shaft extend through the rear to a split nut and lead screw assembly.

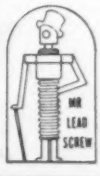
The four-spindle head is driven continuously by the drive motor, feed in by lead screw and split nut, rapid return by air.

On the front of the machine, an air-operated slide to take interchangeable jaws for taking bolts from the bottom of stack magazines and moving forward to threading position. The bolts are clamped into position by an upper clamp plate operated by an air cylinder through a toggle linkage.

Write today for Catalog No. IA-104

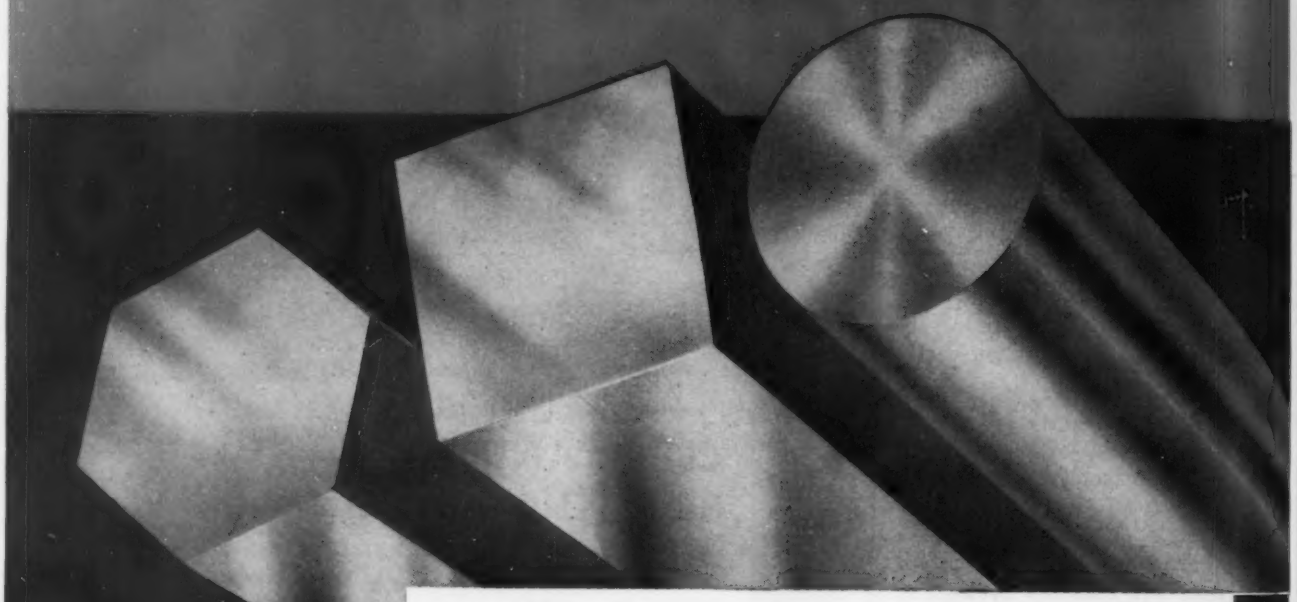
CLEVELAND tapping machine co.

A Subsidiary of AUTOMATIC STEEL PRODUCTS, INC. • CANTON 6, OHIO



"J&L 1200"

COLD FINISHED CARBON STEEL



Use "J&L 1200" steel on your tough jobs for

tops in quality

tops in machinability

tops in uniformity

tops in finish

available in all standard shapes and sizes

It's tops

"J&L 1200" Steel provides the qualities that help machine operators do top-flight work at lower overall costs. With "J&L 1200," the operator obtains: *better machine finishes . . . longer tool life . . . higher rates of speed.* This fact has been proven time and again—in shop after shop.

"J&L 1200" grades meet the compositions published by the A.I.S.I. . . . S.A.E. . . . and Federal Specifications QQS-633.

Try this steel in your own shop. Results will convince you "J&L 1200" deserves to be a regular specification for your production runs.

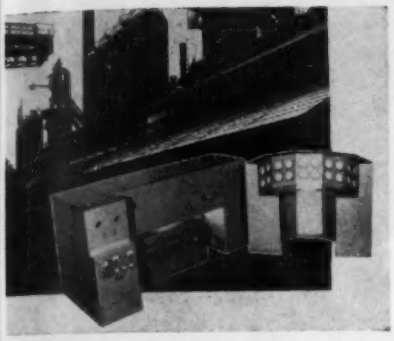
J&L STEEL

Jones & Laughlin

STEEL CORPORATION — *Pittsburgh*

NEW EQUIPMENT

New and improved production ideas, equipment, services and methods described here offer production economies . . . for more data use the free postcard on page 245 or 246



Direct Readers for research and production control

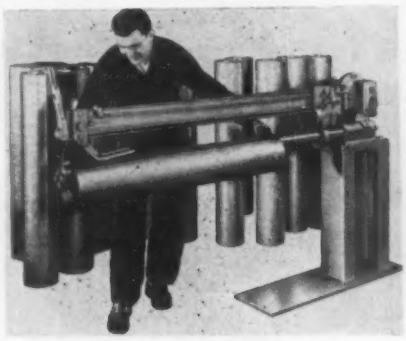
Metals producers and fabricators are offered two types of direct reading spectrometers. A research model is designed for improved analytical facility in handling a wider range of materials under diverse conditions of sample concentration, range, excitation, elements and matrices. A production control Direct Reader is for routine control problems which involve a limited number of elements and ranges. It is recommended for familiar problems where basic changes in production are not anticipated. Both instruments provide increased stability and simplified and accelerated operation and service. *Baird Associates, Inc.*

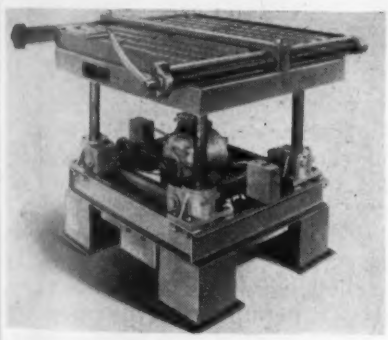
For more data circle No. 28 on postcard, p. 245.

Groover closes single and Pittsburgh lock seams

With interchangeable horns and rolls, a new universal power groover will close both single lock seams and Pittsburgh lock seams. With a nominal working length of 48 in., the groover is equipped with adjustable stops to hold work stationary on the horn. Rolls are mounted in swinging cradles to permit front roll engagement on out-stroke and rear roll engagement on return. Adjusting wheel enables close regulation of roll pressure to conform with thickness of material. Seaming horn can be rotated and locked for grooving inside seams or turned to flat side for grooving outside seams. *Niagara Machine & Tool Works.*

For more data circle No. 29 on postcard, p. 245.





Rubber molds positioned mechanically with Portelvator

This stationary lift was engineered to facilitate the placing of heavy molds into a two level rubber forming press. The molds are moved from the 41x44 in. roller top table by means of a bar extending across the table and operated by a hand crank. This motivates two screws, one on each side of the table top, causing the bar to move the mold easily from the table to the press cavity. Mold is removed from press by a chain attachment to bar, and reversal of screw rotation. A 3 hp motor with reversing magnetic starter activates the table top which has a load capacity of 1700 lb. Movement is pushbutton controlled. *Hamilton Tool Co.*

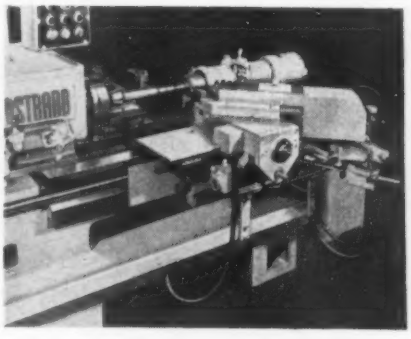
For more data circle No. 30 on postcard, p. 245.

Ruff, semi-finish and finish cuts taken with one tool

For multi-cycle single point turning of irregular shapes, Sundstrand automatic lathes can be provided with a template controlled tracing slide mounted to the regular front carriage. With this attachment and controls, ruff, semi-finish and finish cuts can be taken with one turning tool in one automatic cycle. Only one template is required for all three cuts. The machine can be set up for one, two or three cycles depending on job requirements. Regular cross feeding rear slide can be used to square up shoulders, chamfer, etc. Cycle changing is quick and easy. *Sundstrand Machine Tool Co.*

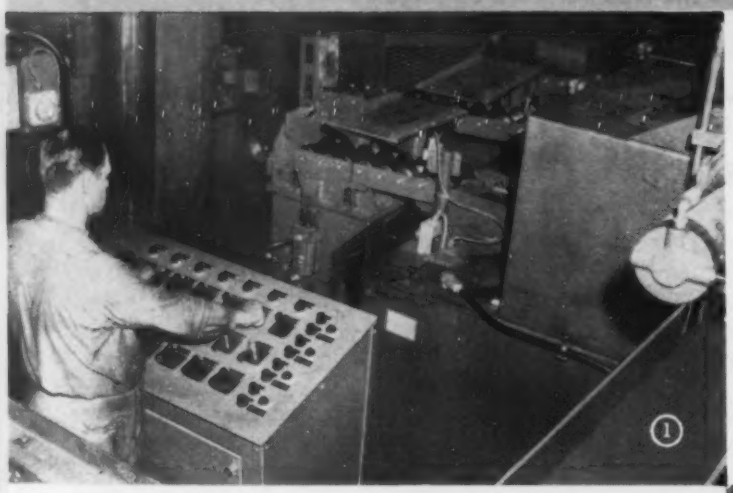
For more data circle No. 31 on postcard, p. 245.

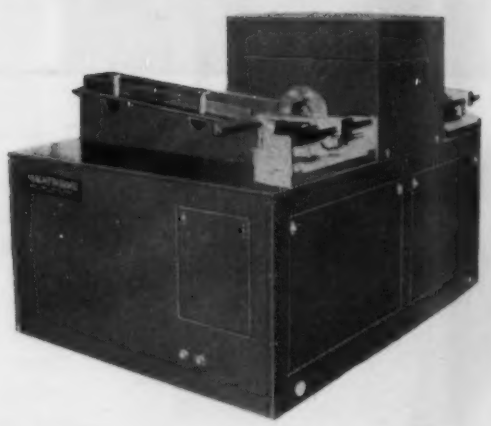
Turn Page

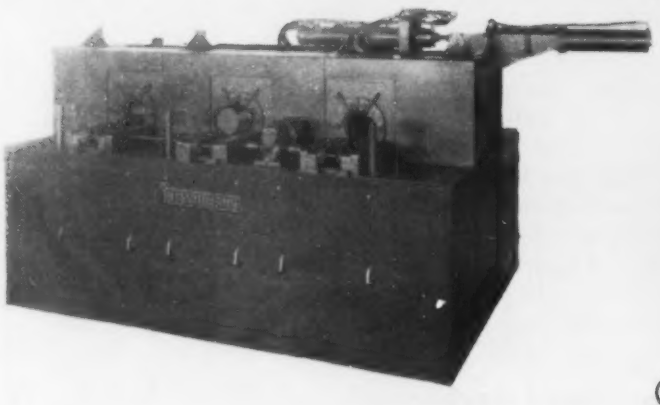


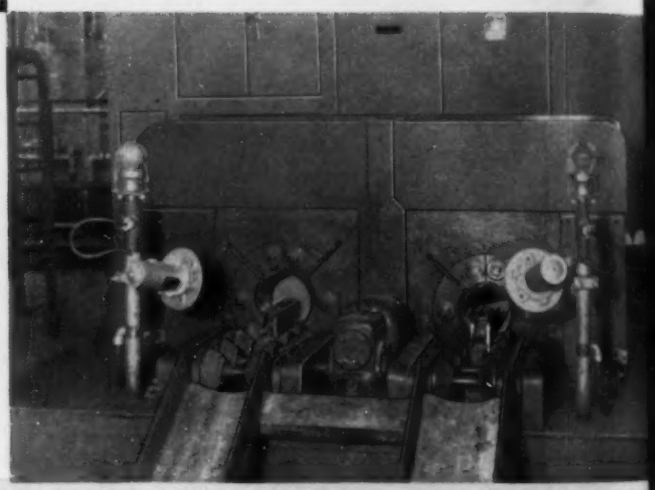
SPEED OF HEATING (2-3 minutes per billet)

Attracts More and More Copper and Brass Peopl to Low-Frequency Induction Heating









1. Control Stand for brass heater. From pulpit, operator can handle all functions step by step, or he can switch to "Automatic Control" —six buttons on press column.
2. For small production, a single coil 175 KW, 2300 volts, 3-phase, 60 cycles. Heats 60—5" billets per hour.
3. Heats 72—7" dia. billets per hour. Three-coil, 2300 volts.
4. For billets 7" dia. and 24" long—two-coil brass heater rated 700 KW—pre-heats 7,500 lbs. per hour.

Copper or brass billets are heated in two or three minutes with a Magnethermic . . . as compared with hours by other methods. Speed is not the only advantage of induction heating. You eliminate need for scheduling billets ahead of time since a Magnethermic does not require warm-up time. Press the button and a hot billet will be ready in minutes. Maintenance is limited to coil repair (changed in 10 minutes or relined in less than two hours as compared to furnace relinings requiring days.

Heaters operate efficiently on extrusion billets, wire bars and other conventional shapes. The low first cost of 60-cycle heating, plus the advantages of speed, space, rapid start, accurate temperature control, has caused more and more copper and brass people to seriously consider this method, pioneered by Magnethermic. Some recent installations are shown here.

Your inquiry . . .

If you want information on a Magnethermic Heater for your plant, let us know what size billet you intend to heat; for what use; and desired production rate. Your inquiry will receive prompt attention.

60-CYCLE

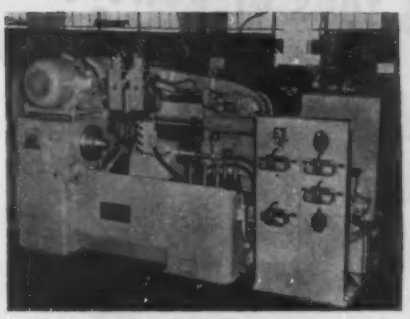
MAGNETHERMIC

corporation

3990 SIMON R[illegible] YOUNGSTOWN 7, OHIO

INDUCTION HEATING

Multiple tooling cuts costs in parts manufacture



Production of automotive stem pinions with two machines instead of the former three, both machines being easily handled by a single operator, has saved manhours and capital investment for one automotive manufacturer. Part of the machining efficiency is traceable to design of the automatic lathes that permits maximum utilization of multiple carbide tooling. Short tool travel to engage the work and during cutting allows the parts to be produced in minimum time. The stem pinions are machined from SAE 4620 steel forgings. *Hydra-Feed Machine Tool Corp.*

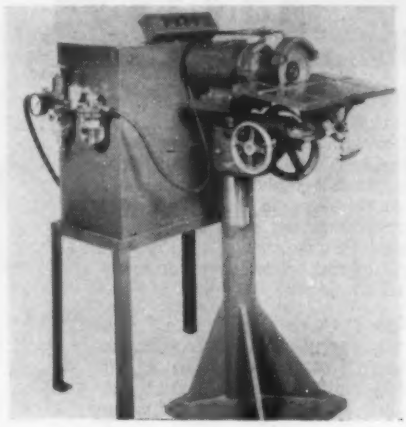
For more data circle No. 32 on postcard, p. 245.

Converts punch press to automatic operation

A hydraulically driven feeding and straightening machine quickly converts a manually operated punch press to automatic operation. Known as the 418-HRP, it will handle stock up to 0.125 in. thick. Three sizes having roll widths of 12½, 18½, and 24½ in. are available. A wide range of feeding speed selectivity properly synchronizes feeding and punching productions. The unit can be moved from one punch press to another by a fork truck. *F. J. Littell Machine Co.*

For more data circle No. 33 on postcard, p. 245.

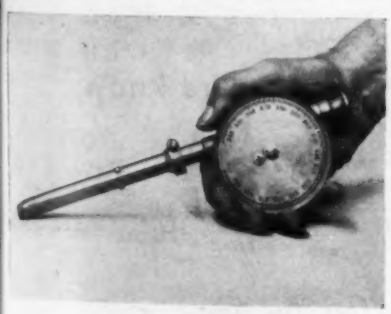
Grinder provides high-speed carbide removal



A high-velocity, single-point carbide tool grinder called the Hi-V operates at 10,800 rpm to combine customary rough and finish grinds into one high-speed operation. The result is a cubic inch rate of carbide removal said to be five times greater than possible by conventional methods. Use of ultra high speed with a nickel bond diamond wheel and a special fluid to limit energy absorption in the wheel applies approximately 95 pct of the total energy developed to the carbide tool face. As a result, the manufacturer states, the wheel functions with a minimum of wear while permitting high-speed carbide removal. The motor spindle provides two speeds of rotation with both right and left-hand use. High speed operation at 10,800 rpm and a low speed of 3600 rpm are allowed by frequency converter. *Ohio Metal Working Products Co.*

For more data circle No. 34 on postcard, p. 245.

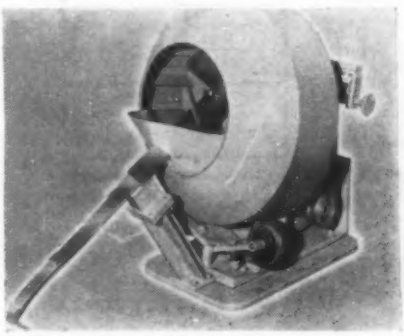
Gage measures inside tube diameters to 0.001 in.



A simple but accurate tube gage has been designed to measure the inside diameters of small tubes and tube sheet openings in condensers and heat exchangers. A large dial with graduations especially for heat exchange and condenser tubes can be read directly in thousandths of an inch and enables tube expanders and controls to be set exactly for tube rolling. The gage measures tube or tube sheet hole inside diameters with three hardened steel balls that protrude from a hollow-steel barrel giving a three-point contact. ID is read directly from the dial. *Elliott Co.*

For more data circle No. 35 on postcard, p. 245.

Tumble hopper feeds variety of parts at high rate



This Model 400 tumble hopper is 24 in. in diameter, the largest of three sizes available. It is self-contained, mounted on a flat base, of fabricated steel construction, extremely rigid in design. Powered by a ¼ hp, three phase motor, production rate is high and variable by means of the integral variable drive. The unit is readily adaptable to assembly presses, centerless grinders, secondary operation machines or other high production machinery. Range of work fed includes washers, nut blanks, nuts, special stampings and headed parts to ½ in. diam. *Feedall Machine & Engineering Co.*

For more data circle No. 36 on postcard, p. 245.

Turn Page

8 tons of power!

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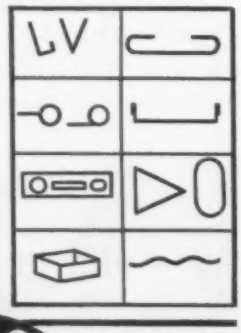
NEW DI-ACRO* PRESS BRAKE

Eliminate tie-up of a large press brake on short-run production jobs with the new Di-Acro Press Brake. It's quickly set up for experimental engineering, too. Hand operated—ample power is provided for average use by a simple cam lever mechanism, plus a power multiplying ratchet drive for heavy forming jobs.

New Di-Acro Press Brake forms 16 gauge mild sheet steel across the full 24" forming width, 10 gauge mild sheet steel across a 12" width as well as other ductile materials. Available with standard dies and specials—both are interchangeable with other press brakes.

See Di-Acro Exhibit
BOOTH 1215
National Metal Show
Chicago—Nov. 1-5

Diagrams show Di-Acro Press Brake Operations.



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Low-maintenance welders

New industrial line of low maintenance, ac welders for high speed production consists of NEMA

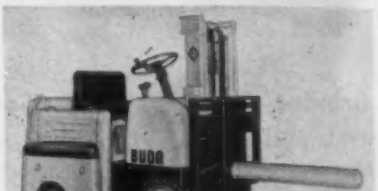
rated 300, 400, and 500 amp models. They feature stepless current control, siiicone insulation, aluminum coil windings, and are equipped with a large current scale which the operator can read from a considerable distance without returning to the welder. Wide current ranges enable the welders to be used on practically all industrial applications, ranging from light-duty, low current, to heavy-duty, high current welding jobs. Finger-tip current adjustment and quieter operation are made possible by a feature in which the coil supports float in a special rubber bushing. *General Electric Co.*

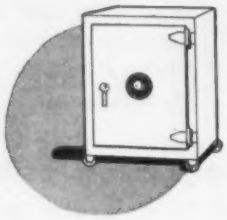
For more data circle No. 37 on postcard, p. 345.

Ram attachment

The ram to supplement the line of attachments for the Buda fork lift truck simplifies the handling of coils and reels of wire, metal strapping, paper rolls, metal and clay pipe, or similar products with a hollow center. It is available in standard lengths of 36 and 48 in. Special lengths are available upon request. *Buda Co., Div. Allis-Chalmers Mfg. Co.*

For more data circle No. 38 on postcard, p. 345.





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Grinding fixture

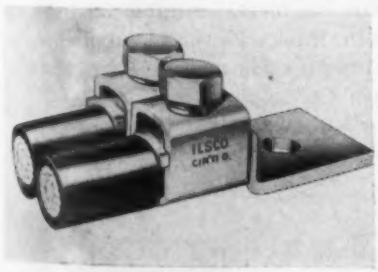
New micrometer grinding fixture has been designed for setting the proper offset when sharpening circular form tools used in automatic screw machines and recessing tools.

It can be used on any toolroom surface grinder having a magnetic chuck, or (by bolting to the table) on universal type grinders. Advantages include faster, easier setup for grinding and measuring face offset and closer control over tool diameters and angles for accurate work. *Scully-Jones & Co.*

For more data circle No. 39 on postcard, p. 245.

Solderless connections

LU-2 multiple lug is available with a wire range for two 4/0 to 1/0 cables. Compact design permits two cables to be installed in the space ordinarily required for one larger cable. Wires are wedged between arched pressure bar and

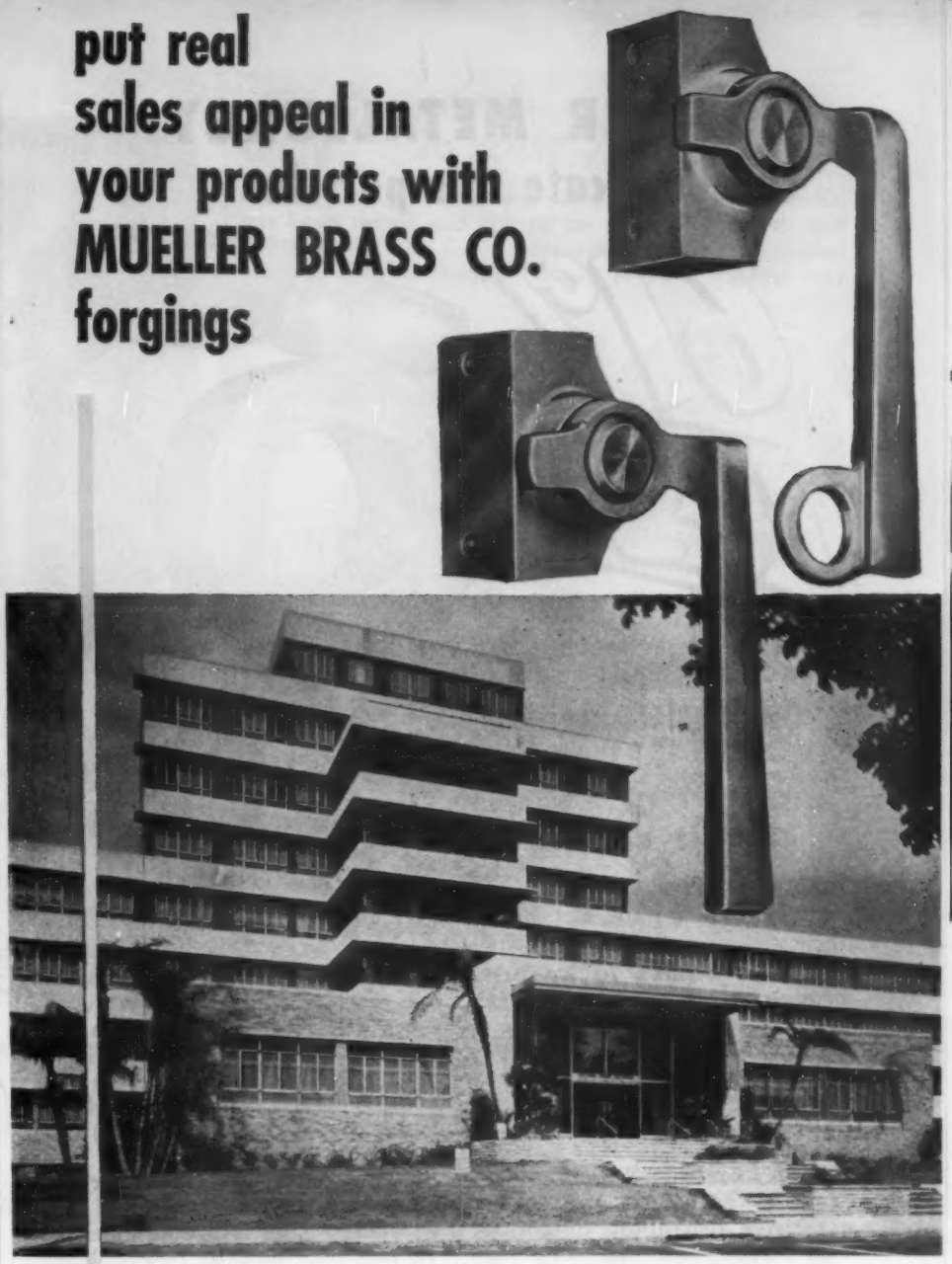


V-bottom collar. This establishes a "for keeps" grip on the conductors with positive contact assured at all times. Solderless connections are made quickly with socket wrench. *Ilsco Copper Tube & Products, Inc.*

For more data circle No. 40 on postcard, p. 245.

Turn Page

put real sales appeal in your products with MUELLER BRASS CO. forgings



Windows in this modern new Florida hospital supplied by Valley Metal Products Co.—subsidiary, Mueller Brass Co.

The aluminum hardware used on all the windows in this modern hospital is a good example of the sales appeal that can be built into a product with Mueller Brass Co. forgings. These forgings are smart in design, practical in operation, and low in cost. They can also be produced in natural bronze or chrome finish depending on the desires of the architect or builder.

All Mueller Brass Co. forgings have a dense, close-grained structure with a high tensile strength. Weight savings up to 40% are possible in the design of parts because of the close tolerances to which they can be produced. Less scrap and longer tool life result from the easy machinability of forged parts. Mueller Brass Co. is completely equipped to produce brass, bronze or aluminum forgings to your specifications. For complete details, write us today.

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The answer to your production problems may well be Powdermet* parts...and Yale & Towne. For Yale & Towne has the experience and know-how to serve you best in this rapidly-developing new field.

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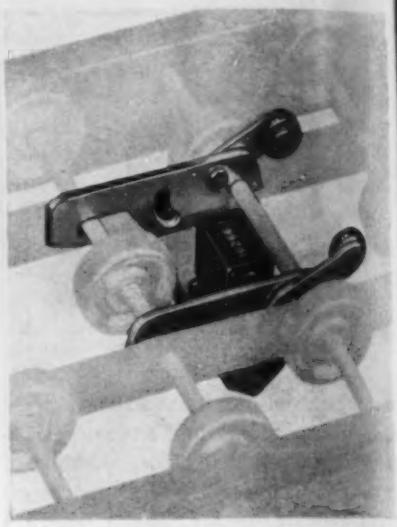
Case counter

A useful conveyor accessory where a count of cases, cartons and packages is required in receiving and shipping operations provides an accurate, automatic check of the exact number of cartons or packages



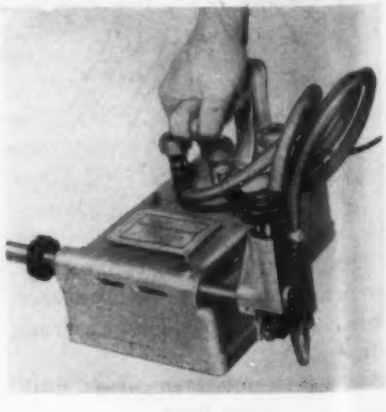
that have passed over a section of gravity wheel conveyor. When an item depresses the free-wheeling rollers on counter arms, the case counter is actuated by one digit. The unit counts to 99,999 then starts over. *Rapids-Standard Co., Inc.*

For more data circle No. 41 on postcard, p. 245.

Powered torch

Portable flame cutting machine is said to equal stationary types in performance. The 16 lb machine will cut in a straight line or bevel; cut circles and shapes with equal ease on metal ranging from ⅛ to 4 in. thick. Power is supplied by a 110v 60 cycle motor. *Burdett Oxygen Co.*

For more data circle No. 42 on postcard, p. 245.



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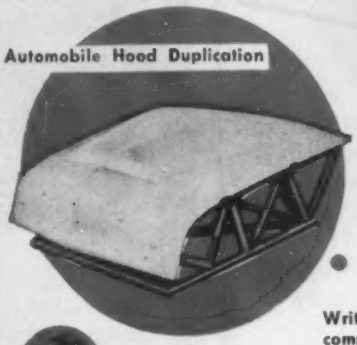
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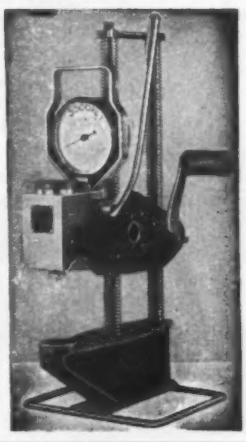

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Saves 80 pct downtime

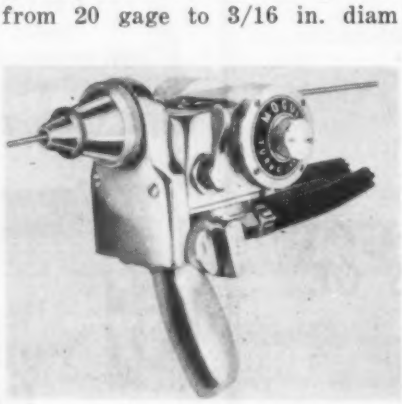
New taper micrometer measures taper while the piece is still on the machine as easily and as quickly as the diameter of a straight bar can be measured with an ordinary

micrometer. Accuracy of the Taper-Mike allows measurement of the taper in tenths, and its simplicity of use reduces downtime to minutes. Scrap loss is reduced as workpiece needs no recentering. *Taper Micrometer Corp.*

For more data circle No. 43 on postcard, p. 245.

Metallizing gun

New Turbo-Jet metallizing gun is stated to be so flexible that one gun will take care of all spraying operations — production, maintenance, and anti-corrosion spraying applications. It sprays an extremely fine, dense coating using wire from 20 gage to 3/16 in. diam



from the highest melting point molybdenum to the lowest melting point wires. It is not necessary to change worms, gears, or feed rolls. The Mogul Turbo-Jet operates on actylene, propane, or natural gas. Gun weighs 5½ lb, is said to be perfectly balanced. *Metallizing Co. of America.*

For more data circle No. 44 on postcard, p. 245.

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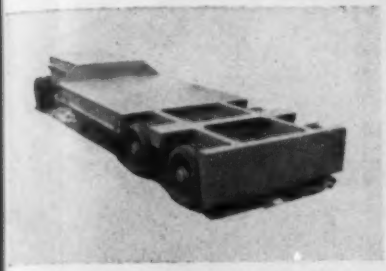
Intraplant trailers

This low bed heavy duty trailer has been developed for hauling heavy industrial units from place to place within plants where rail facilities are not available. It has a capacity of 50 tons. Four tires at the front and eight at the rear

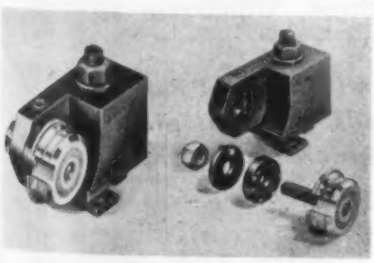


rock laterally and longitudinally to distribute the load equally. These tires are solid rubber with wide faces to minimize the road impact. Hauled by tractor or industrial truck their travel is limited only by width clearances. Trailer is 8 x 25 ft less drawbar. *Rogers Brothers Corp.*

For more data circle No. 45 on postcard, p. 245.

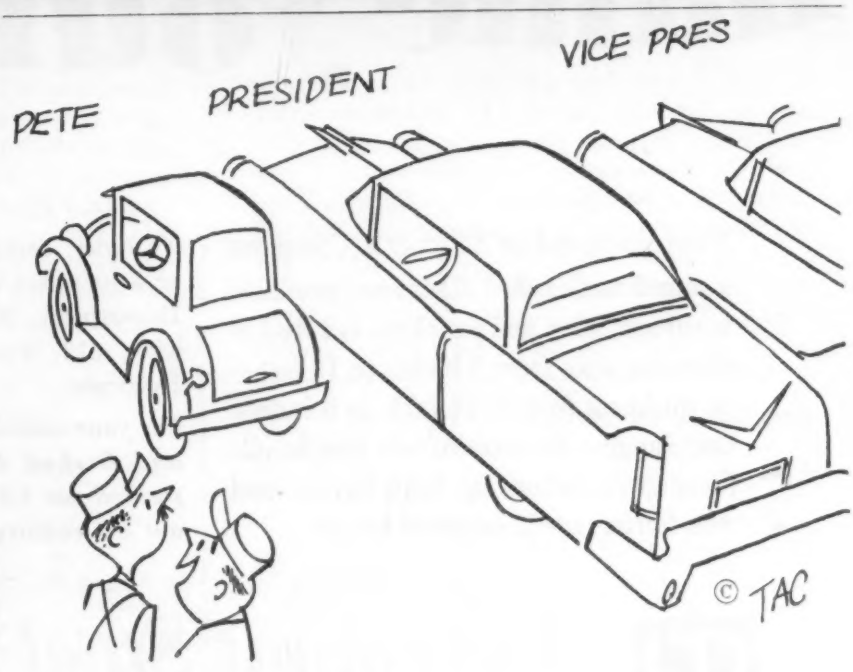
Cross-slide tool post

An adaptable cross-slide tool post enables the user to employ smaller less costly circular form tools on larger automatic-screw machines. Known as the Adaptool-post, the new fixture eliminates the conventional hook clamp which holds the form tool. Pin holes are not re-



quired since a special adapter ring is provided. Special screw adjustment provides positive and accurate setting of the cutting edge, permitting greater clearance. Provision is made for squaring the tool with the work. Either front or rear styles are available, both made of hardened precision ground steel alloy. *American Cam Co.*

For more data circle No. 46 on postcard, p. 245.



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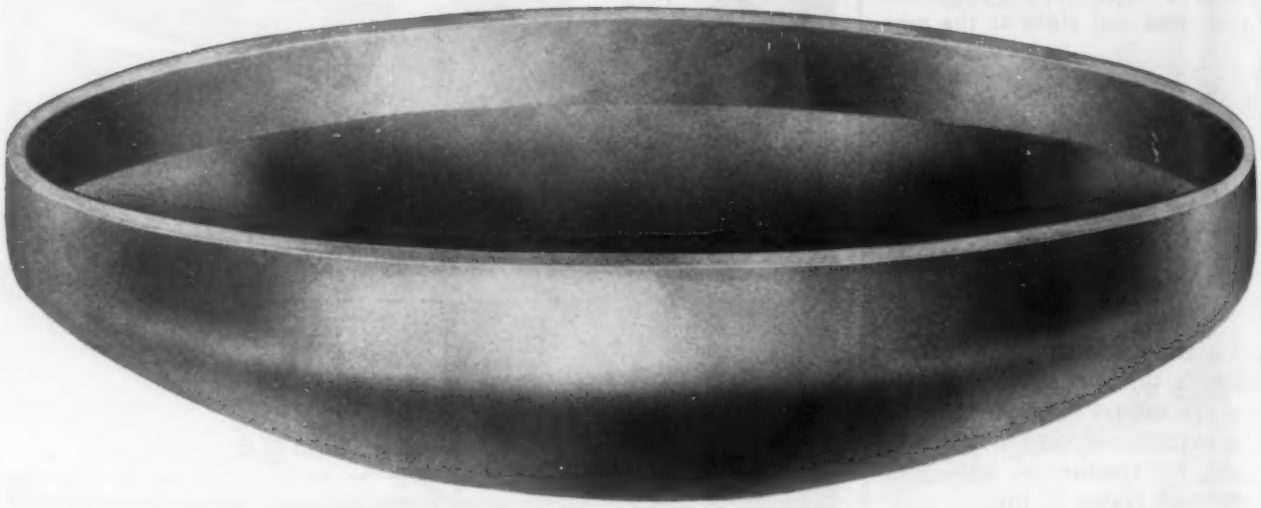

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2680

The Iron Age SUMMARY . . .

Steel users in a buying mood as market recovery gains momentum . . . Order backlogs beginning to climb, deliveries more extended.

Recovery . . . This week the steel market recovery is gaining momentum like a single wing attack to the strong side. It should continue to carve out gains week by week; it will be awfully hard to stop.

The psychology is different, too. Some of the same steel buyers who were still talking about trimming inventories a few weeks ago are now concerned about the prospect of a shortage of cold-rolled sheets. They have reason to be concerned. While a few weeks ago they could get delivery of cold-rolled sheets within 4 weeks or less, it now takes anywhere from 6 to 12 weeks, depending upon the mill with which the order is placed.

Inventories . . . It is obvious that some steel inventories which had been trimmed to the bare bones are now inadequate. As deliveries become more extended, it is necessary to place orders farther in advance of needs. It also becomes necessary to stock more material. This means more buying—to raise inventories to desired level, as well as to meet fall production schedules. That seems to be what is happening now and this is the reason the recovery seems to have come with such startling rapidity.

New Orders . . . Added to this, of course, is a week by week pickup in automotive orders. The auto industry consumes about half of all the cold-rolled sheets produced. As it starts gearing up production it puts plenty of pressure on the cold-rolled sheet market, and the pressure will eventually have an effect on other flat-rolled products as well.

So it's not hard to understand why so many purchasing agents have decided that now is the time to buy: There are reasons of necessity, as well as psychology. Result is that new orders continue to roll in. Since deliveries are being extended (order backlogs are climbing), we know that new orders are gaining even faster than production.

Production . . . Steelmaking operations this week are scheduled at 74.0 pct of rated capacity, a gain of 1.5 points from the previous week. This week's rate is within 1.6 points of the high for the year established during the week of Jan. 24. Production is expected to hit a new high for the year within the next week or two. Steel ingot production index this week is estimated at 109.3 (1947-49 = 100). This is a gain of 1.3 points from last week's index rating of 108.0.

Steel Output, Operating Rates

	This Week†	Last Week	Month Ago	Year Ago
Production (Net tons, 000 omitted)	1,755	1,735*	1,637	2,142
Ingot Index (1947—49=100)	109.3	108.0*	101.9	133.3
Operating Rates				
Chicago	77.5	76.0*	68.5	97.0
Pittsburgh	71.0	71.0*	67.0	97.5
Philadelphia	64.0	62.0	58.0	96.0
Valley	69.0	68.0	57.0	98.0
West	81.0	84.0*	84.0	99.5
Detroit	94.0	93.0	84.0	92.0
Buffalo	75.5	70.5	56.5	106.5
Cleveland	74.0	75.0*	75.0	95.0
Birmingham	74.0	74.0	75.0	96.0
S. Ohio River	88.0	82.0	79.0	78.5
Wheeling	88.0	91.0*	93.0	97.0
St. Louis	76.5	76.5	69.0	95.5
East	48.0	49.0*	46.0	87.5
Aggregate	74.0	72.5	68.0	95.0

*Revised. †Tentative

Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite prices				
Finished Steel, base	4.798	4.798	4.801	4.634
Pig Iron (gross ton)	$56.59	$56.59	$56.59	$56.59
Scrap, No. 1 hvy (gross ton)	$33.00	$33.00	$30.17	$32.83
Nonferrous				
Aluminum, ingot	22.20	22.20	22.20	21.50
Copper, electrolytic	30.00	30.00	30.00	29.50
Lead, St. Louis	14.80	14.80	14.55	13.30
Magnesium, ingot	27.75	27.75	27.75	27.00
Nickel, electrolytic	63.08	63.08	63.08	63.08
Tin, Straits, N. Y.	93.00	93.375	93.625	80.25
Zinc, E. St. Louis	11.50	11.50	11.50	10.00

STEEL PRODUCT MARKETS

Swing To Long Term Orders

Consumers are placing orders further ahead . . . Switch from last summer's short-term ordering is felt most in alloys, cold-rolled sheets . . . Warehouse demand up.

◆ STEEL consumer purchasing policy is reversing itself. Users are placing orders farther ahead, in contrast with short-term ordering that prevailed when business was in the doldrums. The reversal is being felt in some hard-hit items, including alloy steel.

Deliveries are becoming more extended on some products. In the Chicago district, some mills are quoting 8 to 12 weeks on cold-rolled sheets, although out-of-area producers can ship in about six weeks. The cold-rolled sheet market is tightening up in other areas as well.

Hot-rolled carbon bars are gaining strength, and alloy bars also are picking up as automobile producers gradually increase their orders. Cold-finished bars are still easy. Alloy forgings are handicapped by heavy consumer inventories.

Oil country goods continue strong, although more competitive. Standard pipe is in good demand. Plate and structurals are no better than fair in most centers and November is expected to inject a seasonal decline in structurals as construction eases. Strip and hot-rolled sheet are improving, but not so fast as cold-rolled sheets. Stainless demand is picking up slowly. The tinplate market is only fair.

SHEETS AND STRIP . . . Sheet demand is healthy, with orders coming in from a broad range of industries — appliances, automotive, even toys. In **Pittsburgh** district, one producer is sold out on cold-rolled sheets to last week of November; hot-rolled demand also is picking up in this area. **Chicago** reports cold-rolled deliveries extended from 8 to 12 weeks, although some mills are quoting 6-week delivery; hot-rolled and strip are recovering more slowly. In the **East**, there has been a steady upturn during September-October but no extended backlog as yet; galvanized is booked 7 weeks for hot dip, 12 weeks for continuous. Cold-rolled sheets will be tight through November-December in **Cleveland**; some mills are quoting mid-December delivery.

BARS . . . In **Pittsburgh**, the hot-rolled bar market is gaining strength; alloy bars also are picking up and consumers are ordering farther ahead. **Chicago** finds more activity in hot-rolled but cold-finished continues to suffer from lack of warehouse interest. On the **West Coast**, mills are active and looking forward to a better fourth quarter than expected.

PLATE AND STRUCTURALS . . . **West Coast** plate producers are looking forward to business generated by 1450-mile gas pipe line which is in the works for the Pacific Northwest. In **Chicago**, plates are moving in fair tonnage with some producers noting mild increase; outlook for future only so-so; delivery on 2-3 week basis. Plates are slowest item on product list in the **East**, but 1955 prospects received shot in the arm with awarding of contract for atom-powered super carrier to Bethlehem's Quincy, Mass., shipyard. Seasonal downturn in construction will hit structural market soon. Meanwhile highway bridges and school contracts are sustaining demand in the **East**. In **Chicago**, light structurals and wide-flange beams are in fair demand.

Purchasing Agent's Checklist

ALLOYS: Producers see an uptrend beginning . . . . . p. 172

SCRAP: Climbing steel output plus export is boosting price . . . . p. 168

TITANIUM: See promising future in aircraft . . . . . p. 175

ECONOMY: See stability with some upswing in 1955 . . . . . p. 181

PIPE AND TUBING . . . **Pittsburgh** reports oil country goods in solid demand and mechanical tubing gaining strength; standard pipe market is holding up. In the **East**, standard pipe is booming; September was year's best month and October expected to be still better; mechanical and pressure tubing is showing an upturn after summer lull; warehouses account for most of the increased tonnage; oil country down about 30 pct from early summer peak due to inventory correction by drillers. **Cleveland** also notes a slackening in oil country demand due to inventory problems of consumers. Pickup in seamless and electricweld in **Chicago** is holding firm.

WIRE . . . **Pittsburgh** finds merchant wire easing seasonally, manufacturers wire moving up; construction products are off seasonally, although ahead of last year at same time. In the **East**, merchant wire is slowing although nails are still active; manufacturers wire demand is up. **Chicago** finds the wire market in good shape with upturns in most grades. In **Cleveland**, sales are being maintained but rural and building applications are hitting seasonal slump.

WAREHOUSE . . . A big warehouse chain has adopted a county-by-county delivered pricing system similar to one recently abandoned by Republic Steel Corp. The system is operating in Philadelphia and New England, is on trial in Ohio. Chief deviation from the Republic plan is that customers within a county pay same delivered price. Warehouse business generally continues to show improvement. **West Coast** reports healthier conditions but distributors are loaded with small quantity orders. In **Chicago**, a gradual improvement is apparent; warehouse ordering from the mills is aimed at reducing floor tonnages, and business may be better than it looks.

RAILS . . . U. S. Steel Corp. will rehabilitate and modernize its No. 2 rail mill at Edgar Thomson Works. New reheating facilities will be installed and roll stands will be relocated; work was started earlier on facilities for end-hardening of rails. In line with railroad demand for heavy rails, No. 1 rail mill, producer of light rails, will be abandoned. Nos. 2 and 3 mills will handle the necessary volume of heavy rails. Project is scheduled for completion next year. Relocation of roll stands on No. 2 mill will permit rolling of three standard length rails from one bloom compared wih two rails at present.

Comparison of Prices

(Effective Oct. 19, 1954)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Oct. 19 1954	Oct. 12 1954	Sept. 21 1954	Oct. 20 1953
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	4.05¢	4.05¢	4.05¢	3.925¢
Cold-rolled sheets	4.95	4.95	4.95	4.775
Galvanized sheets (10 ga.)	5.45	5.45	5.45	5.275
Hot-rolled strip	4.05	4.05	4.05	3.925
Cold-rolled strip	5.82	5.82	5.82	5.575
Plate	4.225	4.225	4.237	4.10
Plates wrought iron	9.30	9.30	9.30	9.30
Stainl's C-R strip (No. 302)	41.50	41.50	41.50	41.50
Tin and Ternplate: (per base box)				
Tinplate (1.50 lb.) cokes	$9.05	$9.05	$8.95	$8.95
Tinplate, electro (0.50 lb.)	7.75	7.75	7.65	7.65
Special coated mfg. ternes	7.85	7.85	7.75	7.75
Bars and Shapes: (per pound)				
Merchant bars	4.30¢	4.30¢	4.312¢	4.15¢
Cold-finished bars	5.40	5.40	5.40	5.20
Alloy bars	5.075	5.075	5.075	4.875
Structural shapes	4.25	4.25	4.25	4.10
Stainless bars (No. 302)	35.50	35.50	35.50	35.50
Wrought iron bars	10.40	10.40	10.40	10.40
Wire: (per pound)				
Bright wire	5.75¢	5.75¢	5.75¢	5.525¢
Rails: (per 100 lb.)				
Heavy rails	$4.45	$4.45	$4.45	$4.325
Light rails	5.35	5.35	5.35	5.20
Semifinished Steel: (per net ton)				
Rerolling billets	$64.00	$64.00	$64.00	$62.00
Slabs, rerolling	64.00	64.00	64.00	62.00
Forging billets	78.00	78.00	78.00	75.50
Alloy blooms, billets, slabs	86.00	86.00	86.00	82.00
Wire Rod and Skelp: (per pound)				
Wire rods	4.675¢	4.675¢	4.675¢	4.525¢
Skelp	3.90	3.90	3.90	3.75
Finished Steel Composite: (per pound)				
Base price	4.798¢	4.798¢	4.801¢	4.634¢

	Oct. 19 1954	Oct. 12 1954	Sept. 21 1954	Oct. 20 1953
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$61.19	$61.19	$61.19	$61.19
Foundry, Valley	56.50	56.50	56.50	56.50
Foundry, Southern, Cin'ti	60.43	60.43	60.43	60.43
Foundry, Birmingham	52.88	52.88	52.88	52.88
Foundry, Chicago	56.50	56.50	56.50	56.50
Basic del'd Philadelphia	60.27	60.27	60.27	60.27
Basic, Valley furnace	56.00	56.00	56.00	56.00
Malleable, Chicago	56.50	56.50	56.50	56.50
Malleable, Valley	56.50	56.50	56.50	56.50
Ferromanganese‡, cents per lb.	9.50¢	9.50¢	9.50¢	10.00¢
‡ 74-76 pct Mn base.				
Pig Iron Composite: (per gross ton)				
Pig iron	$56.59	$56.59	$56.59	$56.59
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$34.50	$34.50	$31.50	$35.50
No. 1 steel, Phila. area	31.00	30.00	28.50	31.50
No. 1 steel, Chicago	*33.50*	34.50	30.50	31.50
No. 1 bundles, Detroit	26.50	26.50	25.00	27.50
Low phos., Youngstown	35.50	35.50	32.50	37.50
No. 1 mach'y cast, Pittsburgh	42.50	42.50	42.50	43.50
No. 1 mach'y cast, Philadel'a.	42.50	41.00	41.00	41.00
No. 1 mach'y cast, Chicago	43.50	43.50	42.50	37.00
Steel Scrap Composite: (per gross ton)				
No. 1 heavy melting scrap	$33.00	$33.00	$30.17	$32.83
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.38	$14.38	$14.38	$14.75
Foundry coke, prompt	16.75	16.75	16.75	16.75
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	30.00	30.00	30.00	29.50‡
Copper, Lake, Conn.	30.00	30.00	30.00	30.125
Tin, Straits, New York	*93.00*†	93.375	93.625	80.25
Zinc, East St. Louis	11.50	11.50	11.50	10.00
Lead, St. Louis	14.80	14.80	14.55	13.30
Aluminum, virgin ingot	22.20	22.20	22.20	21.50
Nickel, electrolytic	63.08	63.08	63.08	63.08
Magnesium, ingot	27.75	27.75	27.75	27.00
Antimony, Laredo, Tex.	28.50	28.50	28.50	34.50

† Tentative. ‡ Average. * Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

←To identify producers, see Key on P. 329→

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Bethlehem *B3*	58.00	58.50	59.00	59.50	.....
Birmingham *R3*	52.38	52.88	.....	.....	.....
Birmingham *W9*	52.38	52.88	.....	.....	.....
Birmingham *U4*	52.38	52.88	56.50	.....	.....
Buffalo *R3*	56.00	56.50	57.00	.....	.....
Buffalo *I11*	56.00	56.50	57.00	.....	.....
Buffalo *W6*	56.00	56.50	57.00	.....	.....
Chicago *I4*	56.00	56.50	56.50	57.00	.....
Cleveland *A5*	56.00	56.50	56.50	57.00	61.00
Cleveland *R3*	56.00	56.50	56.50	.....	.....
Daingerfield *L3*	52.50	52.50	52.50	.....	.....
Duluth *I4*	56.00	56.50	56.50	57.00	.....
Erie *I4*	56.00	56.50	56.50	57.00	.....
Everett *M6*	.....	61.00	61.50	.....	.....
Fontana *K1*	62.00	62.50	.....	.....	.....
Geneva, Utah *C7*	56.00	56.50	.....	.....	.....
Granite City *G2*	57.90	58.40	58.90	.....	.....
Hubbard *Y1*	.....	.....	56.50	.....	.....
Minnequa *C6*	58.00	59.00	59.00	.....	.....
Monessen *P6*	56.00	.....	.....	.....	.....
Neville Isl. *P4*	56.00	56.50	56.50	.....	.....
Pittsburgh *U1*	56.00	.....	.....	57.00	.....
Sharpsville *S3*	56.00	56.50	56.50	57.00	.....
So. Chicago *R3*	56.00	.....	56.50	.....	.....
Steelton *B3*	58.00	58.50	59.00	59.50	64.00
Swedeland *A2*	58.00	58.50	59.00	59.50	.....
Toledo *I4*	56.00	56.50	56.50	57.00	.....
Troy, N. Y. *R3*	58.00	58.50	59.00	59.50	64.00
Youngstown *Y1*	.....	.....	56.50	57.00	.....
N. Tonawanda *T1*	.....	56.50	57.00	.....	.....

DIFFERENTIALS: Add 50¢ per ton for each 0.25 pct silicon over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.50 pct manganese over 1 pct, $2 per ton for 0.5 to 0.75 pct nickel, $1 for each additional, 0.25 pct nickel. Subtract 38¢ per ton for phosphorus content 0.70 and over.

Silvery iron: Buffalo, *H1*, $60.25; Jackson, *J1*, *G1* $47.00. Add $1.50 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. Add $1 per ton for 0.75 pct or more phosphorus. Add 75¢ for each 0.50 pct manganese over 1.0 pct. Bessemer ferrosilicon prices are $1 over comparable silvery iron.

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	301	302	303	304	316	321	347	410	416	430
Ingots, rerolling	16.25	17.25	18.75	18.25	28.00	22.75	24.50	14.00	.....	14.25
Slabs, billets, rerolling	20.50	22.75	24.75	23.75	36.25	29.50	32.25	18.25	.....	18.50
Forg. discs, die blocks, rings	38.50	38.50	41.50	40.50	60.00	45.50	50.75	31.00	31.75	31.75
Billets, forging	29.50	29.75	32.25	31.00	46.50	35.25	39.50	24.00	24.50	24.50
Bars, wires, structurals	35.25	35.50	38.25	37.25	55.50	42.00	46.75	28.75	29.25	29.25
Plates	37.25	37.50	39.75	39.75	58.75	45.75	51.25	30.00	30.50	30.50
Sheets	41.25	41.50	48.75	43.75	62.75	50.50	59.25	34.25	41.25	34.75
Strip, hot-rolled	29.75	32.00	36.75	34.25	53.25	41.00	46.50	26.25	.....	27.00
Strip, cold-rolled	38.25	41.50	45.50	43.75	62.75–63.00	50.50–50.75	59.25	34.25	41.25	34.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11*; Brackenridge, Pa., *A3*; Butler, Pa., *A7*; McKeesport, Pa., *U1*; Washington, Pa., *W2*, *J2*, Baltimore, *E1*; Middletown, O., *A7*; Massillon, O., *R3*; Gary, *U1*; Bridgeville, Pa., *U2*; New Castle, Ind., *I2*; Ft. Wayne, *J4*.

Strip: Midland, Pa., *C11*; Cleveland, *A5*; Carnegie, Pa., *S9*; McKeesport, Pa., *F1*; Reading, Pa., *C2*; Washington, Pa., *W2*; W. Leechburg, Pa., *A3*; Bridgeville, Pa., *U2*; Detroit, *M2*; Canton-Massillon, O., *R3*; Middletown, O., *A7*; Harrison, N. J., *D3*; Youngstown, *C5*; Sharon, Pa., *S1*; Butler, Pa., *A7*; Wallingford, Conn., *U3* (.25¢ per lb higher) *W1* (.25¢ per lb higher); New Bedford, Mass., *R6*.

Bar: Baltimore, *A7*; Duquesne, Pa., *U1*; Munhall, Pa., *U1*; Reading, Pa., *C2*; Titusville, Pa., *U2*; Washington, Pa., *J2*; McKeesport, Pa., *U1*, *F1*; Bridgeville, Pa., *U2*; Dunkirk, N. Y., *A3*; Massillon, O., *R3*; Chicago, *U1*; Syracuse, N. Y., *C11*; Watervliet, N. Y., *A3*; Waukegan, *A5*; Canton, O., *T5*; Ft. Wayne, *I4*.

Wire: Waukegan, *A5*; Massillon, O., *R3*; McKeesport, Pa., *F1*; Ft. Wayne, *J4*; Harrison, N. J., *D3*; Baltimore, *A7*; Dunkirk, *A3*; Monessen, *P1*; Syracuse, *C11*; Bridgeville, *U2*.

Structurals: Baltimore, *A7*; Massillon, O., *R3*; Chicago, Ill., *J4*; Watervliet, N. Y., *A3*; Syracuse, *C11*.

Plates: Brackenridge, Pa., *A3*; Chicago, *U1*; Munhall, Pa., *U1*; Midland, Pa., *C11*; New Castle, Ind., *I2*; Middletown, *A7*; Washington, Pa., *J2*; Cleveland, Massillon, *R3*; Coatesville, Pa., *C15*.

Forged discs, die blocks, rings: Pittsburgh, *C11*; Syracuse, *C11*; Ferndale, Mich., *A3*; Washington, Pa *J2*.

Forging billets: Midland, Pa., *C11*; Baltimore, *A7*; Washington, Pa., *J2*; McKeesport, *F1*; Massillon Canton, O., *R3*; Watervliet, *A3*; Pittsburgh, Chicago, *U1*; Syracuse, *C11*.

Strikes End, Copper Released

Authorize sale of 17,500 tons of copper accumulated under production incentive contracts . . . It's not stockpile metal, but stockpile shipments may be diverted—By *R. L. Hatschek*.

◆ STRIKES in the copper refineries are over. Production at Kennecott Copper Corp.'s Arthur refinery and American Smelting & Refining Co.'s Garfield refinery was resumed last week when labor and management agreed to submit the dispute over wages and benefits to a fact-finding board. But the board's recommendation will not be binding. The Federal Mediation and Conciliation Service panel was scheduled to meet in Salt Lake City this week.

And now that the workers are back on their jobs, any government action to bail out hard-pressed copper consumers can no no longer be called strike breaking. So action was taken almost immediately.

Office of Defense Mobilization has authorized the sale at market price of 17,500 tons of refined copper accumulated under the Defense Production Act. This is not metal in the strategic stockpile—it is metal purchased under the government's production-incentive program. Hence it did not require President Eisenhower's declaring a national emergency.

Another 9000 tons which was scheduled for delivery to the stockpile may be diverted to domestic consumers if producers so desire. This metal must now be delivered to the stockpile by June 30, 1955. ODM also recommended strict Commerce Dept. control on copper exports.

Thus with copper consumer's pipelines running dry, the government has acted swiftly to refill them. And the trade believes that, pending the supply situation next month, November stockpile shipments may also be diverted.

COPPER . . . First reaction to the strikes' end was an immediate decline in copper scrap prices. It took place at both dealer and consumer levels with most prices dropping 1¢ or more by the end of the week.

Statistically, the domestic picture drawn for September by the Copper Institute is about what you'd expect. Crude primary output snapped back somewhat from the preceding month to total 61,612 tons while refined production sagged to 87,623 tons from 103,901 in August and 107,095 in July. Deliveries to fabricators dipped even further to 88,947 in September (August, 92,475 tons). Refined stocks slipped off 10,721 tons to 47,666 tons held at the beginning of this month.

Outside the U. S., where the strikes ended earlier, the rebound was sooner. September figures for primary crude (125,082 tons), refined production (107,489 tons) and delivered to fabricators (110,234 tons) were all higher than the August totals and the decrease in stocks was only 278 tons to 172,048 tons.

ALUMINUM . . . Canadian aluminum capacity is getting a 60,000-ton boost with the addition of new facilities at the Kitimat smelter of Aluminum Co. of Canada. The Pacific Coast plant was started up on Aug. 3 with an initial capacity of 91,500 tons annually. Work is scheduled to start at once.

Planned eventual capacity of the plant is 550,000 tons a year and provision was made for this expansion when the facility was first designed. Consequently, the per ton cost of current expansion will be far less than original installation costs. But the company still expects to spend some $45 million for the expansion in the coming 2 years.

LEAD . . . General Services Administration last week accepted stockpile offerings of lead producers to the tune of 10,000 to 11,000 tons, about the same as last month. Thus, it appears, fears expressed in the trade on stockpiling policy at current prices were unfounded.

It had been thought, especially when GSA did not seek offers at the same time zinc notices were sent, that the government might not be interested in buying with the New York price at 15.00¢ per lb. Then, when producers were asked to offer metal, some feared that the tonnage accepted would be lower at this price.

With the end of the stockpile flurry for this month, the consumer market is again quiet and demand characterized as light to moderate. London prices have been easing off slightly but are still ahead of parity with New York quotations. Consumer preference, in this light, is for flat price buying.

ZINC . . . Buying activity in zinc, after a fair start, tapered off a bit at the end of last week. But it was generally expected in the trade that consumers would start their November buying sometime this week. As with lead, current prices are firmly supported by stockpiling activity—they can't go down.

TITANIUM . . . An accelerated amortization certificate has been granted Electro Metallurgical Div. of Union Carbide & Carbon Corp. for 90 pct of the $31.5 million titanium sponge plant it is building at Ashtabula, O. Capacity will be at least 7500 tons annually and production will be by a sodium reduction method (See THE IRON AGE, Sept. 23, p. 65).

Aluminum Co. of America is also getting a fast tax writeoff on titanium facilities. Alcoa's Cleveland works is getting $300,000 worth of titanium forging facilities, of which 65 pct may be written off in 5 years. Forgings will be for use in various types of military aircraft.

Daily Nonferrous Metal Prices

(Cents per lb except as noted)

	Oct. 13	Oct. 14	Oct. 15	Oct. 16	Oct. 18	Oct. 19
Copper, electro, Conn.	30.00	30.00	30.00	30.00	30.00	30.00
Copper, Lake, delivered	30.00	30.00	30.00	30.00	30.00	30.00
Tin, Straits, New York	93.375	93.125	93.00	....	93.00	93.00*
Zinc, East St. Louis	11.50	11.50	11.50	11.50	11.50	11.50
Lead, St. Louis	14.80	14.80	14.80	14.80	14.80	14.80

Note: Quotations are going prices **Tentative*

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News of Used and Rebuilt Machinery

Pittsburgh Business Slow . . . For used and rebuilt equipment dealers in the Pittsburgh district, business continues relatively slow although improved over the summer.

Supply outstrips demand by a wide margin. Prices for the most part are holding firm, but some dealers are resorting to price-cutting in an effort to unload equipment. Buyers are cautious and insistent upon quality, late model machines.

Mills Are Cautious . . . Steel mills are particularly careful about committing themselves on a purchase. One dealer recalls that when business was good he was reasonably sure of an order if he sold the chief engineer on a piece of equipment. It doesn't work that way any more. The chief engineer in turn must do a selling job on the purchasing agent, who then puts the matter before top management. The purchase is not made unless the equipment is urgently needed to maintain production.

Heavy Tool Inventories . . . In the machine tool field, dealers are loaded with inventory. And they are plagued by a flood of equipment from some automobile companies which have been tooling-up for new model cars. According to reports here, some of these tools are being sold at a profit of only $25 per machine. There has been little or no activity in the Pittsburgh area in the way of auction sales.

In electrical equipment, the market is depressed. Coal mine business is non-existent. And buying by the steel mills is spotty. One dealer has a considerable volume of business pending with the mills, but finds that it's hard to close deals.

Study Surplus Tools . . . Of the estimated 400,000 government-owned machine tools many are currently being used by Navy, Air Force, Ordnance Corps and other branches.

Some time ago Office of Defense Mobilization instructed various branches of the government to review their machine tool problem, dispose of unneeded and useless tools, prepare suitable storage and, where practical, rebuild the balance. ODM hopes to complete the program in 3 to 5 years. The agency's purchase of new tools will be limited to large, long lead-time machines.

MDNA Inspects Tools . . . Machinery Dealers National Assn. along with representatives of the Machine Tool Builders and the government have inspected tools located in about 24 plants and there are more scheduled. When it is determined which tools should be rebuilt, their specifications and where they are to be stored, there will be a considerable amount of rebuilding work. Some of this work will be done by tool builders, some by the Army, Navy, Air Force, etc.

MDNA president Dick Nathans, executive director Randy Vinson, and Chairman of MDNA Industry Affairs Committee met recently with ODM along with three representatives each from the Machine Tool Builders Assn. and the Distributors Assn. to discuss the surplus problem. ODM officials expressed agreement that machine tool disposal should be gradual.

Ask Smaller Deposits . . . Early last summer MDNA petitioned the Department of Defense to make it possible for machinery dealers to bid on surplus equipment at government-held auctions without the requirement of depositing a certified check to cover the amount of the bid.

Proposal was referred to Defense Department's policy committee along with two additional subjects: (1) Possible extension of time for payment, (2) Right to make 20 pct down payment.